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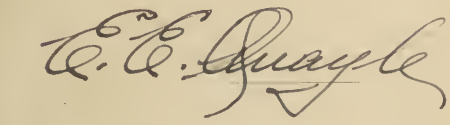
USEFUL DRUGS

PREPARED UNDER THE DIRECTION AND SUPERVISION
OF THE COUNCIL ON PHARMACY AND CHEMISTRY
OF THE AMERICAN MEDICAL ASSOCIATION



A List of Drugs Selected to Supply the Demand for a Less Extensive Materia Medica and Especially to Serve as a Basis for the Teaching of Materia Medica and Therapeutics, and for Examinations on These Subjects by State Licensing Boards, with a Brief Discussion of Their Actions, Uses and Dosage.

Sixth Edition

PRESS OF THE AMERICAN MEDICAL ASSOCIATION
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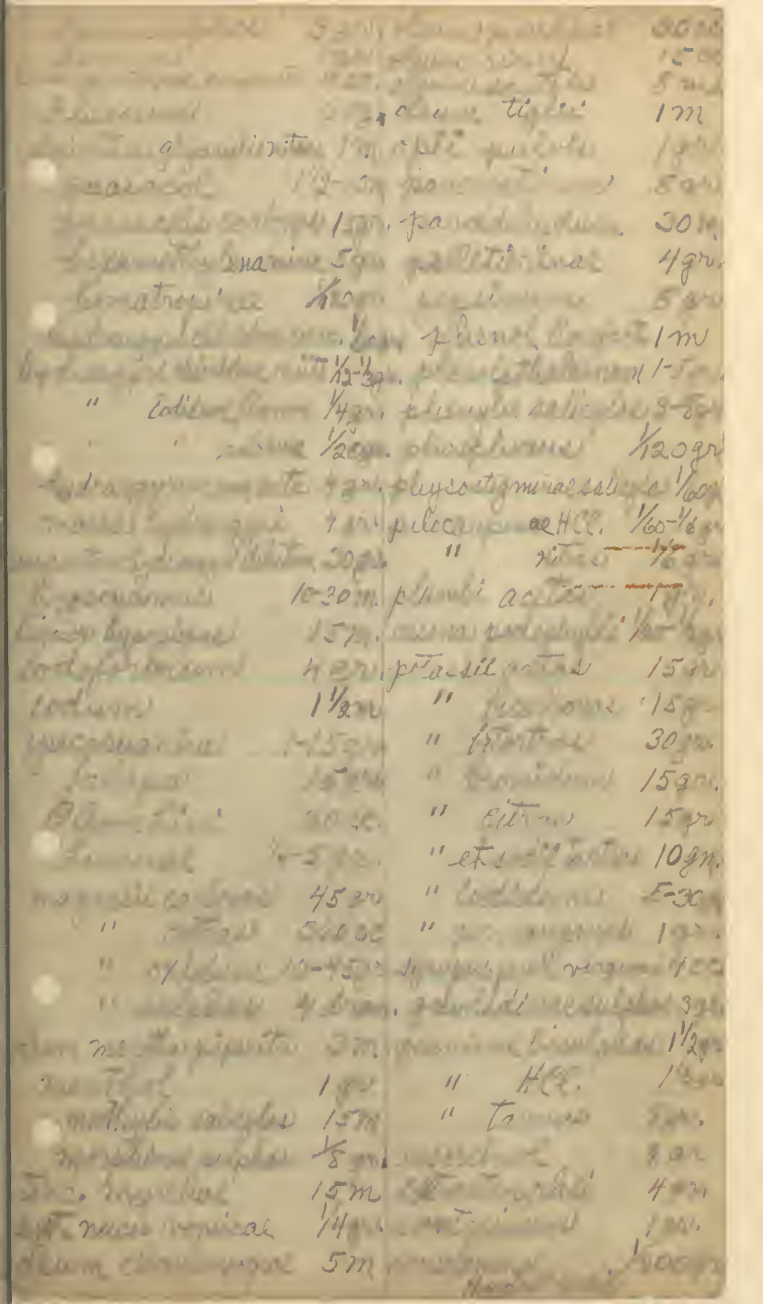
I



II

PREFACE TO SECOND EDITION
1916

It has long been recognized that the multiplicity of drugs and preparations of drugs presented to the attention of the medical profession is an evil. Leaving out of account the articles described in the National Formulary and the vast number described in dispensatories and similar unofficial compilations, the number of drugs and preparations described in the Pharmacopeia alone is far too large for intelligent practical use. Of even greater importance is the well-known fact that a considerable proportion of pharmacopeial drugs and preparations are superfluous or worthless. Repeated attempts to eliminate such articles from the Pharmacopeia have failed because they have uniformly encountered the objection that the articles or preparations are used by some physicians and therefore should be recognized and authoritatively defined.

In the preface to the last edition of his "Text-Book of Pharmacology and Therapeutics," Cushny announces that the space devoted to many of the less important and less reliable drugs has been much curtailed, that many have been omitted altogether from consideration, and that this is in accordance with the general trend of medical progress and further that therapeutics would probably not have suffered from an even more drastic selection. He further says:

> "For as long as he [the medical student] has to learn the supposed virtues of a host of obscure substances, he will tend to use them in practice, even if only tentatively. This in turn necessitates their inclusion in the pharmacopeias, which again gives them some standing and perpetuates them as subjects of teaching and examination. If examiners would break this vicious circle, they would render the subject of pharmacology more attractive to him. There is no question that the insistence on numberless preparations of drugs of questionable value has discouraged interest in therapeutics."

Efforts were made by the Council on Medical Education of the American Medical Association and the Confederation of State Examining and Licensing Boards to restrict instruction and examination in materia medica to the more important drugs, and this suggested the desirability of selecting a fundamental list of drugs with which all medical students and practitioners might be expected to be familiar and to which, therefore, state examining and licensing boards might largely or entirely confine their examinations in materia medica. A list prepared by the Council on Medical Education and the National Confederation of State Medical Examining

and Licensing Boards was taken as a basis by the Council on Pharmacy and Chemistry, and, after various revisions, more or less guided by numerous criticisms and suggestions from teachers of materia medica, deans of medical schools, secretaries and members of state medical examining and licensing boards, and other members of the medical profession, was published in a preliminary form under the title "Useful Remedies." After still further revision in the light of advice and information elicited through this preliminary publication, the first edition of the present volume was published under the title "A Handbook of Useful Drugs." This little work presented a brief but practical discussion, from the modern point of view, of the drugs which remained after the winnowing and sifting process above described. It was offered as a text on which teachers of materia medica and therapeutics might base their instruction and state examining boards their examinations. In the words of the preface to the first edition, it was "confidently predicted that an intelligent and critical use of these selected drugs will prove their general sufficiency and show that many drugs now discussed in textbooks are superfluous and that many newly discovered or widely exploited proprietary preparations have no advantage over those contained in this book." This prediction has been more and more justified since the original publication in 1913. A number of medical schools and state medical examining and licensing boards have taken "Useful Drugs" as a basis for their instruction and examinations in materia medica.

As the time of publication of the ninth revision of the U. S. Pharmacopeia and the fourth edition of the National Formulary coincided with the preparation of this edition of "Useful Drugs," the changes in the requirements of these two official books of standards have naturally been incorporated in this volume.

PREFACE TO THIRD EDITION
1917

The only important changes from the 1916 edition consist in the addition of Theophylline and of Antimeningococcus Serum, which appeared to the Council of sufficient therapeutic importance to be counted among "Useful Drugs"; and the omission of Dilute Hydrocyanic Acid and of Diacetylmorphin (Heroin) Hydrochlorid. The following reasons prompted the Council to order these deletions:

Dilute hydrocyanic acid was admitted to "Useful Drugs" because of its importance as a poison. This is no longer a sufficient justification for its inclusion, since it has become practically obsolete as a remedial agent. The Council therefore directed its omission from future editions of "Useful Drugs."

Heroin was included in "Useful Drugs" because of its extensive use in coughs, etc. This use originated largely because of claims, no longer accepted, that heroin was a safe drug, especially from the habit producing standpoint, as well as on account of other claimed advantages which further work has failed to confirm.

The Council holds that heroin has no advantage over morphin; that it shares every disadvantage of morphin; and that, on the whole, its introduction has been harmful, in that it furnished a specious means on the one hand for avoiding the well founded popular fears of morphin by substituting another habit-forming drug.

While heroin undoubtedly accomplishes whatever morphin accomplishes, and in *that* sense may be considered as a useful drug, it does not deserve a place in the selected list that is authorized by the Council.

PREFACE TO FOURTH EDITION
1920

The present revision involves a few additions and deletions; also some minor changes in the descriptions. These changes have been made in a consistent endeavor to emphasize especially the information that would be of most value in medical practice. In a few cases—the local anesthetics, for instance—the articles have been practically rewritten.

The common and convenient nonproprietary names of albutannin, arsphenamin, barbital, neoarsphenamin and procain have been adopted in place of the monopolistic and nondescriptive proprietary titles; and the nonproprietary name cinchophen in the place of the cumbersome pharmacopeial term, phenylcinchoninic acid.

The following drugs have been omitted:

Ammonium acetate: As our knowledge of this drug has developed, its efficacy has become so doubtful that it no longer deserves a place in a list of selected drugs.

Lobelia: The use of this drug is so restricted that it does not seem to merit a place in this list.

Novatophan: This does not seem to have established sufficient advantage over cinchophen to entitle it to separate notice.

Sodium arsanilate: As the use of this drug is justified only in the African sleeping sickness, it has little practical interest in this country. Its toxicity makes it an undesirable arsenical.

The following drugs have been admitted:

Argyrol type of silver preparations: The difference between the argyrol and protargol types is such as to render separate descriptions desirable.

Chloramin-T and Dichloramin-T: These have achieved sufficient importance to deserve admission to the list.

Incidental mention has also been made in the descriptions of a few drugs which, while useful, are rather minor modifications, and therefore not of sufficient importance to deserve separate titles. Instances of such are emetin-bismuth iodid, mentioned under emetin; mercury benzoate and succinimid, mentioned with the mercury salicylate; and alypin, holocain and tropacocain, under cocain.

PREFACE TO FIFTH EDITION
1921

In the present edition some revision of the text was made in the endeavor to keep Useful Drugs abreast of the times and to make it of increased value to physicians and medical students.

The last edition contained, under argenti proteinas, a description of silver protein preparations of the protargol type and of the argyrol type. In the present edition these appear, respectively, under the nonproprietary names *protargin fortius* and *protargin mite,* which have been selected by the Council on Pharmacy and Chemistry for these two classes of silver preparations.

The following drugs have been omitted:

Bismuth Subsalicylate: This was omitted because it appears to have no advantage over other bismuth preparations.

Citrated Caffein: The only advantage of this preparation over caffein itself is its greater solubility which is slight.

Hydrastinin Hydrochlorid: This was deleted because the expectations as to its value have not been fulfilled.

Ichthyol: This drug was introduced about forty years ago by Unna, who stated that it was of value in the treatment of various skin diseases. Unna attributed to ichthyol the capacity of causing vasoconstriction and an antiseptic action. He also attributed to the drug the property of producing keratinization. For a time ichthyol enjoyed an extraordinary vogue, especially among dermatologists. A careful study of the literature fails to confirm the claims made by Unna; ichthyol lacks all the properties given by him as a basis for its use. A letter of inquiry sent to a list of dermatologists, gynecologists and general practitioners of recognized standing brought the almost unanimous answer that ichthyol has no therapeutic value, or that it is a simple emollient at best. In consideration of the lack of evidence for the value of ichthyol and the unfavorable opinion expressed by the Council's consultants, the drug has been omitted from this edition of Useful Drugs.

Sodium Arsenate: This has not proved to be an effective and useful drug and appears to be but little used.

Pilocarpus, Physostigma, Morphin and Strychnin: The mention of these drugs was deemed superfluous. The drugs pilocarpus and physostigma are rarely used; instead the salts of their active constituents are employed. Similarly, the free alkaloids, morphin and strychnin, are rarely required and their salts are used.

PREFACE TO SIXTH EDITION
1923

The text of the present edition has been so revised as to bring the statements of the actions, usage and dosage of drugs in accord with present-day knowledge and practice.

The following have been omitted: solution of arsenous and mercuric iodid (Donovan's solution), lime liniment (Carron oil), compound tincture of cinchona, compound extract of colocynth, copaiba, extract of opium, extract of gentian, hydrastis (golden seal) and its preparations, syrup (simple syrup), squill and its preparations, antidiphtheric serum, dried antidiphtheric serum, antitetanic serum, dried tetanus antitoxin and exsiccated sodium sulphite. Antidiphtheric serum, dried antidiphtheric serum, antitetanic serum and dried tetanus antitoxin were omitted because the use of these preparations has been abandoned in favor of, respectively, purified antidiphtheric serum and purified antitetanic serum, which are retained. Syrup (simple syrup) was omitted because it was thought that a simple solution of sugar in water need not be described. The remaining drugs and preparations were omitted because of their decreasing use or because it was felt that they could be replaced with advantage by better or simpler preparations which are still retained.

The following have been admitted: Anhydrous *d*-glucose: The evidence indicates that the intravenous administration of glucose solutions may be of distinct value in hemorrhage, shock, fevers, etc. Chaulmoogra oil and Chaulmestrol (the ethyl esthers of acids of chaulmoogra oil): These are of value in the treatment of leprosy. Insulin: Because of its profound influence on the metabolism of the diabetic, insulin has established itself as a useful and valuable addition to materia medica. Nitrous oxid: The use of this anesthetic has been established for minor operations and as a means of inducing anesthesia preliminary to the administration of ether or chloroform. Luminal: This sedative has certain advantages over other similar-acting drugs, particularly in the treatment of epilepsy. Diphtheria toxin-antitoxin mixture: The value of this has been abundantly demonstrated. Neocinchophen: In addition to the advantage over cinchophen of practical tastelessness, the drug appears to be less prone to produce gastric disturbance. Rabies virus: The reported successes leave little room for doubt as to the value of this

product. Quinidine sulphate: The use of the drug in certain heart affections is still in the experimental stage; however, the reports of favorable results appeared to warrant its inclusion.

The discussion of pharmaceutical preparations, such as confections, honeys, fatty oils, volatile oils, has been transferred from the body of the book to an appendix. The Therapeutic Index has been revised. A series of tables of metric and apothecary equivalents have been added. These changes and additions will, it is believed, make the book of increased usefulness to the general practitioner, to the teacher and to the student.

ABBREVIATIONS

The following abbreviations occur in the text:

U. S. P.—The Pharmacopeia of the United States of America.

N. F.—The National Formulary.

N. N. R.—New and Nonofficial Remedies.

P. I.—International Protocol.

STATEMENT OF SOLUBILITY

For ease of reference the solubility of official articles is indicated in approximate terms in accordance with the following equivalents:

Substances that are soluble in less than
1 part of solvent = very soluble.
From 1 to 10 parts of solvent = freely soluble.
From 10 to 100 parts of solvent = soluble.
From 100 to 1,000 parts of solvent = slightly soluble.
From 1,000 to 10,000 parts of solvent = very slightly soluble.
From 10,000 to 100,000 parts of solvent = nearly insoluble.
More than 100,000 parts of solvent = practically insoluble.

The solubility values are for distilled water at approximately 25 C. (77 F.) and for the official U. S. P. alcohol at the same temperature.

USEFUL DRUGS

Acacia (Acac.), Acacia, U. S. P. (Gum Arabic).—A gummy exudation from *Acacia senegal* and other African species of acacia.

PROPERTIES: Acacia occurs in colorless or pale yellowish opaque brittle, inodorous tears or fragments which are completely soluble in water (1: 2), but practically insoluble in alcohol.

MUCILAGO ACACIAE (MUCIL. ACAC.), MUCILAGE OF ACACIA, U. S. P.—A 35 per cent. solution of acacia in distilled water.

ACTION AND USES: Acacia and its mucilage are used as demulcents and as suspending agents in the making of emulsions and mixtures. In surgery acacia is used to provide intravascular colloid. As its solutions readily ferment, mixtures containing it should be prescribed in small quantities, should be freshly prepared, or else preserved, preferably by being kept cold.

Acetanilidum (Acetanil.), Acetanilid, U. S. P. (Antifebrin).—The monacetyl derivative, $C_6H_5NH(CH_3CO)$, of anilin.

PROPERTIES: Acetanilid is an odorless, crystalline powder, having a slightly burning taste. It is only slightly soluble in water (1: 190), but freely soluble in alcohol (1: 3.4).

INCOMPATIBILITIES: Acetanilid is incompatible with spirit of nitrous ether. It forms a semiliquid mass when triturated with chloral or antipyrin.

ACTION AND USES: Acetanilid is analgesic, antipyretic and, in excessive doses, a cardiac depressant. These effects are probably due to para-aminophenol, into which it is converted in the body.

Moderate doses have little effect on the temperature of normal animals and men, but such doses cause a marked reduction of the temperature in fever. Large doses, or small doses taken habitually, convert hemoglobin into methemoglobin and may destroy the red blood corpuscles. In poisonous doses acetanilid produces cyanosis, abnormal reduction of temperature, coldness of the extremities and profuse sweating. In individuals with an idiosyncrasy toward the drug similar symptoms may be produced by small doses. It should be avoided or used cautiously in patients who are debilitated from any cause, especially those with heart disease. Acetanilid is effective for the relief of headache, neuralgic pain, and for the aches and pains of the fever patient, but is not suited to the treatment of pain caused by inflammation. It has been widely exploited in the form of varying mixtures under different names as a universal analgesic. Many so-called headache powders contain it; its indiscriminate use in this way is dangerous.

Dosage: 0.20 Gm. or 3 grains. It is well to begin with 0.10 Gm. or about 1½ grains and to repeat cautiously. It may be administered dry in the form of powders, cachets or capsules; because of its slight solubility it should not be massed in pills or compressed into tablets unless the tablet is crushed before swallowing or unless care is taken in the manufacture of the tablet to insure its rapid disintegration in the stomach.

The addition of caffein (0.06 to 0.1 Gm., 1 to 1½ grains to each dose) renders it more effective against certain headaches. Formerly mixtures of acetanilid with caffein or ammonium salts were advised on the supposition that the cardiac depression would thus be avoided, but this does not seem to be the case. Investigation has shown that acetanilid is rendered somewhat more toxic by caffein.

Acetphenetidinum (Acetphen.), Acetphenetidin, U. S. P. (Phenacetin).—$C_6H_4(OC_2H_5).NH(CH_3CO)$. Acetphenetidin differs from acetanilid in containing the ethoxyl group C_2H_5O.

Properties: Acetphenetidin occurs as white, crystalline scales or a crystalline powder. It is odorless and slightly bitter. It is very slightly soluble in water (1: 1,310), but soluble in alcohol (1: 15).

Incompatibilities: The same as for acetanilid.

Action and Uses: Similar to those of acetanilid. The analgesic, antipyretic and cardiac depressant effects of acetphenetidin, like those of acetanilid, are due to the formation of para-aminophenol, and its possible advantage over acetanilid is probably due to the fact that this decomposition occurs more slowly. It is best administered in the form of powders, cachets or capsules.

Since the enactment of the Food and Drugs Act, June 30, 1906, acetphenetidin has frequently displaced acetanilid as the active agent in proprietary mixtures for the relief of headache and other pain. Its relation to acetanilid suggests similar caution in its use.

Dosage: A full dose is 0.30 Gm. or 5 grains. It is well to begin with 0.20 Gm. or 3 grains, and repeat every three hours if needed for a few doses. When small doses fail to relieve headache, larger doses are also usually ineffective. For mixtures with caffein see under **Acetanilidum.**

Acidum Aceticum (Acid. Acet.), Acetic Acid, U. S. P.—A solution containing about 36 per cent. by weight of absolute acetic acid, CH_3COOH. (In some European countries a preparation comparable to glacial acetic acid. U. S. P., containing 99 per cent. of absolute acetic acid, is known as acetic acid, and the article that is official in the U. S. P. as "diluted acetic acid" is sometimes described as acetum or vinegar.)

Diluted Acetic Acid, U. S. P., contains 6 per cent. of absolute acetic acid.

PROPERTIES: Acetic acid is a clear, colorless liquid. In all of its forms it is freely miscible with water.

ACTION AND USES: Acetic acid, as such, is not ordinarily used internally, but when administered in the diluted form it is mildly diuretic. Externally it is a rubefacient, caustic and parasiticide.

Acidum Acetylsalicylicum, Acetylsalicylic Acid, N. N. R. (Aspirin).—$C_6H_4O(CH_3CO).COOH$, 1:2. The acetic acid ester of salicylic acid.

PROPERTIES: Acetylsalicylic acid occurs as a crystalline, odorless powder with an acidulous taste. It is slightly soluble in water (1:100) and freely soluble in alcohol.

INCOMPATIBILITIES: Moisture and alkalies decompose it.

ACTION AND USES: Acetylsalicylic acid acts like salicylic acid and the salicylates, but its taste is less nauseant and it seems to be more efficient as an analgesic. It is employed as an antipyretic, analgesic and antirheumatic. It is much used for the relief of headache and colds. Acetylsalicylic acid is not free from untoward secondary effects, somewhat similar to those of sodium salicylate (which see). It sometimes causes urticaria and dangerous acute edema of the respiratory passages.

DOSAGE: 0.3 to 0.6 Gm. or 5 to 10 grains, repeated once in three hours unless symptoms of salicylism (ringing in the ear, etc.) are noted, or other toxic effects develop.

Acidum Benzoicum (Acid. Benz.), Benzoic Acid, U. S. P.—An organic acid, $C_6H_5.COOH$, obtained from benzoin by sublimation, or prepared synthetically.

PROPERTIES: Benzoic acid occurs as lustrous scales or needles, having an odor resembling benzoin, when obtained from the latter, and a pungent, acid taste. It is only slightly soluble in water (1:275), but is soluble in alcohol (1:2.3). It reacts with alkali hydroxids, and carbonates to form water-soluble benzoates.

ACTION AND USES: Benzoic acid is a mild antiseptic. It is excreted in the urine in the form of hippuric acid (benzoyl glycocoll).

DOSAGE: 0.5 Gm. or 8 grains. It is preferably dispensed in the form of powder and may be enclosed, dry, in capsules or cachets. It is more frequently used in the form of soluble compounds (see **Sodii Benzoas**).

Acidum Boricum (Acid. Bor.), Boric Acid, U. S. P. (Boracic Acid, obsolete) $(H_3BO_3) = B(OH)_3$.

PROPERTIES: Boric acid occurs as transparent, colorless scales or a light, unctuous, very fine powder. It is odorless, has a faintly bitter taste and is slowly soluble in water (1:18), soluble in alcohol (1:18) and freely soluble in glycerin (1:4).

ACTION AND USES: Boric acid is a mild antiseptic and astringent. It has been occasionally administered internally, but with little effect, in cystitis. Externally it is frequently used as a dusting powder, either alone or com-

bined with diluents such as starch or talcum, or with active substances such as acetanilid, salicylic acid or iodoform. It is also widely used as a wash or lotion, especially for catarrh of the mucous membranes, cystitis, conjunctivitis, pharyngitis, etc., usually in simple aqueous solutions containing from 2 to 4 per cent. of boric acid. This is one of the most frequently used lotions for conjunctivitis. It is also very useful for irrigating the bladder in cystitis. The glycerite of boroglycerin is employed in washes and injections. The ointment is mildly antiseptic but is chiefly used as a protective dressing.

Glyceritum Boroglycerini (Glycer. Boroglyc.), Glycerite of Boroglycerin, U. S. P.—A glycerin solution representing 31 per cent. of boric acid.

Unguentum Acidi Borici (Ung. Acid. Bor.), Ointment of Boric Acid, U. S. P.—A 10 per cent. mixture of boric acid with paraffin and white petrolatum.

Acidum Citricum (Acid. Cit.), Citric Acid, U. S. P.—A tribasic organic acid, $H_3C_6H_5O_7+H_2O$, usually prepared from the juice of limes or lemons.

Properties: Citric acid forms colorless, transparent crystals; odorless and having an agreeable purely acid taste. It is very soluble in water (1: 0.5) and freely soluble in alcohol (1: 1.8).

Action and Uses: Citric acid is employed as an acid flavor (about 1 per cent.), and in effervescent drinks. It is oxidized in the tissues to carbonic acid, so that it does not act as an acid in the tissues; if given with alkalies, the effects of the latter predominate. Citric acid is not antiscorbutic, and therefore is not an effective substitute for lemon juice.

Dosage: 0.5 Gm. or 8 grains. It may be prescribed in the form of a syrup (Syrupus Acidi Citrici, U. S. P.) or as lemonade.

Acidum Hydrochloricum (Acid. Hydrochl.), Hydrochloric Acid, U. S. P. (Muriatic Acid).—A fuming corrosive liquid containing about 32 per cent. of hydrogen chlorid, HCl.

Acidum Hydrochloricum Dilutum (Acid. Hydrochl. Dil.), Diluted Hydrochloric Acid, U. S. P.—A solution containing about 10 per cent. of hydrogen chlorid, HCl.

Properties: Diluted hydrochloric acid is a colorless, odorless, strongly acid aqueous solution; freely miscible in all proportions with water or alcohol.

Incompatibilities: It is incompatible with alkalies, carbonates and oxids, with which it reacts to form chlorids, and with the soluble salts of silver and of lead, forming insoluble silver chlorid and lead chlorid.

Action and Uses: Hydrochloric acid is the acid of the gastric juice and acts as an antiseptic in the stomach. Acidity is necessary to the digestive action of pepsin. By checking fermentation and putrefaction in the stomach hydrochloric acid tends to prevent these processes in the intestine.

Diluted hydrochloric acid is used for the treatment of diseases of the stomach characterized by a deficiency of acid in the gastric juice on the theory that it replaces the acid lacking in the secretion. To restore the acidity of the stomach contents to the normal average would require much larger doses than are commonly given. It seems probable, therefore, that the acid as ordinarily given acts mainly as a stimulant to the gastric mucosa. The utility of hydrochloric acid in achylia gastrica is more manifest in the nervous forms and in the earlier stages of the organic variety. In some cases it causes distress and should be discontinued. There is some evidence to show that the continued administration of the acid is capable of increasing the gastric secretion. Hydrochloric acid also exerts a favorable influence on the secretion of the pancreatic and intestinal juices and on the motor functions of of the stomach.

Hydrochloric acid is also of service in intestinal putrefaction, when this is due to impairment of gastric digestion. It is indicated in achylia gastrica for the diarrhea caused by the irritant action of undigested meat and the putrefaction of proteins which have escaped gastric digestion.

Dosage: 1 Cc. or 15 minims of the diluted acid in about half a glass of water. It should be given after meals and the dose repeated at the end of an hour. It is best to commence with a few drops and to increase the dose gradually, until relief is obtained or distress produced. Five drops in a wineglassful of water after meals are often sufficient; or it may be taken with the meal.

Acidum Nitricum (Acid. Nitric.), Nitric Acid, U. S. P.—A liquid containing about 68 per cent., by weight, of hydrogen nitrate, HNO_3.

Properties: Nitric acid is colorless, fuming, very caustic and corrosive and has a peculiar, somewhat suffocating odor. It is miscible with water in all proportions, dissolves mercury and most other metals with evolution of red fumes and stains woolen fabrics and animal tissues a bright yellow.

Incompatibilities: Like other inorganic acids, it is incompatible with alkalies, the alkali carbonates, many of the salts of organic acids, and, because of its oxidizing properties, with all readily oxidizable substances. Its addition to organic liquids (alcohol, etc.), is apt to give rise to explosive reactions.

Action and Uses: Nitric acid is a powerful caustic, used for removing warts and small nevi and for cauterizing chancroids and other sores, and the wounds made by

rabid animals, but its action is very painful and not readily controlled. When nitric acid is used as a caustic, the surrounding healthy tissue should be coated with petrolatum and the acid applied on the end of a rod of glass or wood.

Acidum Salicylicum (Acid. Salicyl.), Salicylic Acid, U. S. P.—An organic acid, $C_6H_4(OH)COOH$, generally prepared synthetically from phenol.

PROPERTIES: Salicylic acid occurs as fine, white needles or as a bulky white crystalline, odorless powder, having a sweetish, subsequently acrid taste. It is only slightly soluble in water (1: 460), but freely soluble in alcohol (1: 2.7), or in ether (1: 3). Salicylic acid reacts with alkali hydroxids and carbonates to form water-soluble salts. With solution of ferric chlorid it gives a deep purple color.

INCOMPATIBILITIES: It is incompatible with salts of iron and with spirit of nitrous ether.

ACTION AND USES: Salicylic acid is an antiseptic. It is quite irritant to mucous membranes and somewhat corrosive. Internally it has the actions described under sodium salicylate, in which form it is commonly employed. Externally it has been used as an application in pruritus, urticaria, bromidrosis and in some forms of eczema; also in the form of ointments and collodions to cause exfoliation of corns and warts.

DOSAGE: Internally it is best given in the form of soluble salicylates. (See **Sodii Salicylas.**) Externally it is applied as an astringent in from 1 to 2 per cent. alcoholic solution or ointment; as an antiseptic, antiparasitic and keratolytic agent, in 2 to 5 per cent. dusting-powder, or ointment, and as a strong keratolytic in proportions up to 20 per cent., best dissolved in collodion. Continuous application to the skin may occasion slight corrosion.

Acidum Tannicum (Acid. Tann.), Tannic Acid, U. S. P. (Tannin, Gallotannic Acid).—A tannin usually obtained from nutgalls.

PROPERTIES: Tannic acid occurs as a light yellowish, amorphous powder, gradually turning darker when exposed to air and light. It has a faint, characteristic odor and a strongly astringent taste. Tannic acid is very soluble in water, alcohol and glycerin.

INCOMPATIBILITIES: It is incompatible with alkalies, alkaloids, salts of iron and of most other metals, albumin and gelatin. With alkaloids and the salts of the heavy metals it reacts to form insoluble compounds.

ACTION AND USES: Tannic acid is used as an astringent and hemostatic. Internally it has been chiefly employed in the treatment of diarrhea, preferably in the form of

albutannin, acetannin or gambir, as the action of free tannic acid on the stomach may produce nausea or vomiting. It should be employed not as the principal curative agent, but as an occasional adjunct to proper dietetic and physical remedies when the discharges are unduly profuse. Local applications of tannic acid are frequently made to inflamed mucous membrane, especially in pharyngitis. It is also applied locally in the treatment of hemorrhoids in the form of a 20 per cent. ointment os as a suppository containing 0.1 Gm. or 1½ grains.

DOSAGE: 0.5 Gm. or 8 grains.

GLYCERITUM ACIDI TANNICI (GLYCER. ACID. TANN.), GLYCERITE OF TANNIC ACID, U. S. P. (Glycerite of Tannin).—A 20 per cent. solution of tannic acid in glycerin.

DOSAGE: 2 Cc. or 30 minims, corresponding to 0.4 Gm. or 6 grains of tannic acid. This preparation is chiefly used externally and affords a convenient agent for making dilute solutions for local use. For local applications solutions containing from 0.5 to 2 per cent. of tannic acid are appropriate.

Aconitum (Aconit.), Aconite, U. S. P. (Monkshood, Aconite Root, Aconiti Tuber, P. I.).—The dried tuberous root of *Aconitum napellus* L. Yields not less than 0.5 per cent. of the ether-soluble alkaloids of aconite. When extracted and assayed biologically the minimum lethal dose should not be greater than the equivalent of 0.04 mg. of aconite for each gram of body weight of guinea-pig.

ACTION AND USES: Aconite slows the pulse and thus tends to lower the blood pressure. The nervous system is first stimulated and then depressed. Death occurs from respiratory paralysis. Locally applied, aconite causes tingling, followed by numbness.

Aconite is used internally as a cardiac depressant, antipyretic and diaphoretic, especially in asthenic fevers of short duration or in the initial stage only of other fevers. It should be avoided in fevers accompanied by cardiac weakness. Its efficacy in fevers is doubtful, and its use is constantly diminishing.

Externally it is used in the form of the tincture, as a local application for the relief of neuralgic pain.

TINCTURA ACONITI (TR. ACONIT.), TINCTURE OF ACONITE, U. S. P. (Aconiti Tinctura, P. I.).—Contains from 0.045 to 0.055 per cent. of the ether-soluble alkaloids of aconite.

The chemical assay, however, is not an index of activity. If assayed biologically the minimum lethal dose should not be greater than 0.0004 Cc. for each gram of body weight of guinea-pig. One hundred Cc. represent 10 Gm. of the drug in approximately 65 per cent. of alcohol.

DOSAGE: 0.2 Cc. or 3 minims should be given hourly until the desired effect on the pulse is secured. Locally the tincture may be applied cautiously over the course of the affected nerve, or a liniment containing 10 per cent. of the tincture may be prescribed. The application locally of considerable amounts of undiluted tincture is dangerous, as too much absorption may occur. It should not be applied to mucous membrane.

Adeps, Lard, U. S. P.—True fats, chiefly those of animal origin, form an important class of ointment bases. They are especially valuable when penetrating ointments are desired for softening the skin, for inunctions, etc. Lard is the chief fat thus used. Like all animals fats, it is very likely to become rancid. To mitigate its odor and to hinder the occurrence of rancidity the following preparation is used.

ADEPS BENZOINATUS (ADEPS BENZ.), BENZOINATED LARD, U. S. P.—Benzoinated lard is made by incorporating with lard 1 per cent. of benzoin, and straining.

Adeps Lanae Hydrosus (Adeps Lan. Hyd.), Hydrous Wool Fat, U. S. P. (Lanolin).—This preparation is made by mixing the purified fat of sheep's wool with water in a proportion not to exceed 3 parts of the latter to 7 parts of the former.

Hydrous wool fat is used as an ointment base. It has the advantage that it does not become rancid, and that a considerable amount, as much as twice its weight, of water can be incorporated with it; its odor and consistence are disagreeable. To improve the latter, it is well to add 20 to 100 per cent. of petrolatum. The old statement that it is more readily absorbed than other ointment bases has not been borne out by experience.

Aether, Ether, U. S. P.—A liquid composed of about 96 per cent., by weight, of ethyl oxid, $(C_2H_5)_2O$, and about 4 per cent. of alcohol, C_2H_5OH.

PROPERTIES: It is volatile, inflammable, and the vapors, which are about two and one half times as heavy as air, are dangerously explosive when mixed with air. Ether is soluble in water (1:12) and miscible with alcohol; when administered internally it is usually directed to be dispensed in the form of an alcoholic solution.

ACTION AND USES: Ether is used mainly by inhalation for the production of anesthesia. It depresses all parts of the central nervous system, causing loss of sensation, loss of consciousness and abolition of the reflexes. The vital centers of the medulla are involved very late in the poisoning, a fact which enhances the safety of this anesthetic. The respiratory center is the first of these to be affected. Later there is depression of the vasomotor center and con-

sequent fall of blood pressure. Ether does not produce a marked effect on the heart, but its first action is a moderate reflex stimulation. In the administration of ether as an anesthetic, caution should be exercised to have the ether at a distance from and, if possible, below any fire or flame, to avoid setting fire to the heavy inflammable vapors. For anesthesia a pure ether, preferably anhydrous, should be used. It is occasionally administered internally, particularly in spirit form, as an anodyne, sedative, carminative and antispasmodic.

DOSAGE: 1 Cc. or 15 minims.

SPIRITUS AETHERIS (SP. AETH.), SPIRIT OF ETHER, U. S. P. —A 32.5 per cent. alcoholic solution.

DOSAGE: 4 Cc. or 1 fluidram, well diluted with cold water or on cracked ice.

Aether Nitrosus, Nitrous Ether.—Ethyl nitrite, $C_2H_5NO_2$. Used only in the form of:

SPIRITUS AETHERIS NITROSI (SP. AETH. NITROS.), SPIRIT OF NITROUS ETHER, U. S. P. (Sweet Spirit of Niter).—A solution of from 3.5 to 4.5 per cent. of ethyl nitrite in alcohol.

PROPERTIES: Spirit of nitrous ether is a pale yellowish liquid having a fragrant, ethereal and pungent odor and a sharp burning taste. It is miscible with alcohol or water. It deteriorates rapidly.

INCOMPATIBILITIES: It is incompatible with such substances as acetanilid, antipyrin, potassium iodid and sodium salicylate.

ACTION AND USES: Spirit of nitrous ether is popularly used as a weak diuretic and diaphoretic. It is of doubtful value in many of the conditions for which it is commonly used. It is frequently prescribed in mixtures with other diaphoretics, notably the solution of ammonium acetate.

DOSAGE: 2 Cc. or 30 minims, freely diluted with water.

Aethylis Chloridum (Aethyl. Chlor.), Ethyl Chlorid, U. S. P. —Monochlorethane, C_2H_5Cl.

PROPERTIES: Ethyl chlorid is a colorless and very volatile liquid having an agreeable odor and a sweetish, burning taste. It should be preserved in hermetically sealed glass tubes and kept in a cool place remote from light or fire.

ACTION AND USES: Ethyl chlorid is used for minor operations in the form of spray to produce a local anesthesia by refrigeration. When inhaled it produces prompt anesthesia, suitable for very short operations, but even then not without danger of producing accidents similar to those of chloroform. Because of these dangers and the difficulty of handling, it is now rarely used for general anesthesia.

Aethylmorphinae Hydrochloridum (Aethylmorph. Hydrochl.), Ethylmorphin Hydrochlorid, U. S. P. (Ethylmorphin Chlorid, Dionin).

PROPERTIES: Ethylmorphin is an artificial base obtained by the action of ethyl iodid on morphin in the presence of an alkali. The hydrochlorid occurs as a white, microscopically crystalline powder, odorless and having only a slight bitter taste. Ethylmorphin hydrochlorid is freely soluble in water (1: 8) and in alcohol (1: 22), but practically insoluble in ether and in chloroform.

ACTION AND USES: When administered internally, the action of this drug is intermediate between the action of morphin and that of codein, but it is claimed that ethylmorphin hydrochlorid does not produce constipation, nausea or lassitude. The conclusion of careful observers, however, is that, for internal use, it possesses no advantage over codein.

When applied to the eye this drug causes a local vasodilatation, terminating in acute conjunctival edema. The chemosis thus produced is employed for its analgesic and curative effects in conjunctivitis, corneal ulcer, acute glaucoma, iritis, scleritis and other inflammatory diseases of the uveal tract. The greater the edema of the conjunctiva induced by it, the more decided is its analgesic action.

DOSAGE: 0.015 Gm. or ¼ grain. Externally it is commonly employed in a collyrium in strength varying from 5 to 10 per cent. The strength may be increased to 20 per cent., and it is sometimes used in powder form. The ophthalmologist should make the first application and determine the minimum strength of solution which will produce the necessary chemosis. This dose should not be increased until it loses its effect. The action of the remedy may be regarded as sufficient as long as its application is followed by chemosis, redness and burning sensations for from one to two minutes afterward. Under these circumstances it may be instilled once a day. The patient should be instructed that the swelling of the conjunctiva is necessary to the therapeutic action of the remedy and that no harm to the eye will ensue from its use.

In cases of corneal opacity ethylmorphin hydrochlorid has been applied to the eye in the form of powder. It may also be used as an ointment in strength varying from 1.5 to 5 per cent.

Alcohol, Alcohol, U. S. P.—In European pharmacopeias alcohol is usually designated as Spiritus, and varies considerably in strength.

PROPERTIES: The official U. S. P. alcohol is a colorless volatile liquid containing about 94 per cent. by volume of absolute ethyl alcohol, C_2H_5OH, and 6 per cent. by volume of water. It has a characteristic odor and burning taste. It is miscible in all proportions with water, ether or chloroform. In addition to alcohol, the U. S. P. also describes dehydrated alcohol, used as a laboratory reagent, etc., and also diluted alcohol (approximately 50 per cent.) used in pharmacy as a menstruum.

ACTION AND USES: *Externally,* alcohol is a rubefacient and astringent, and by its evaporation, a refrigerant. It is used to harden and cleanse the skin; as a mild counter-irritant (soap liniment), etc. In the concentration of 70 per cent. it is markedly antiseptic and is employed in surgery especially as tincture of green soap, to cleanse the skin of patient and operator.

Internally, alcohol is a narcotic; excessive doses depress and paralyze the central nervous system. Small doses produce euphoria, stimulate respiration, moderately dilate the cutaneous and splanchnic vessels, and modify the circulation. It is burned in the body and thus serves to a restricted extent as a source of energy.

Alcohol is employed as a diffusible stimulant, diaphoretic and hypnotic.[1] In well selected cases, especially in patients accustomed to its use, it may be very valuable; otherwise it is apt to do more harm than good. In practice it is usually administered in the form of whisky, brandy, wine or other alcohol-containing beverages.

In pharmacy alcohol is used as a solvent and, for administering medicines, is largely used as a vehicle in the form of:

ELIXIR AROMATICUM (ELIX. AROM.), AROMATIC ELIXIR, U. S. P. (Simple Elixir).—An aromatic and sweetened liquid containing about 23 per cent. of alcohol, by volume.

Aloe, Aloes, U. S. P.—The inspissated juice of various species of *Aloe* is included in all the pharmacopeias. It is used in its original form, as a watery extract or as a purified extract known as aloin.

PROPERTIES: Aloes differs considerably in color and appearance, but in all its forms it has a rather characteristic color and a nauseous, very bitter taste. Aloes is partially soluble in water.

ACTION AND USES: Aloes belongs to the emodin group of cathartics acting on the large intestine. The effects are similar to those of cascara, but somewhat more irritant.

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1. Instructions to collectors of internal revenue, issued by commissioner of internal revenue, Feb. 1, 1920, regarding the enforcement of the National Prohibition Act, direct, under the head of medical uses of wines and spirits, that physicians who have received permits may prescribe wines and liquors for internal use or alcohol for external uses; there are certain limitations on the quantity prescribed for a single patient at a given time; no alcoholic liquors may be prescribed unless the patient is under the personal supervision of the physician. Prescriptions, except in certain emergencies, must be written on official blanks furnished by the government on which must be indicated clearly the name and address of the patient, including street and apartment number if any, and permit number and date when written; on the stub retained by the physician record must be made of kind and quantity of liquor prescribed and the ailment for which prescribed. The physician must keep a separate record for each patient. The record also must show under the patient's name and address the date of each prescription. These regulations are subject to change, and the prescribing of alcohol is also subject to the restrictions of state laws.

It is convenient for administration as pills, especially in the form of aloin. Purgative doses may produce griping.

Dosage: The purgative dose of aloes is from 0.125 to 0.3 Gm. or from 2 to 5 grains. For the treatment of chronic constipation smaller doses, 0.03 to 0.06 Gm. or ½ to 1 grain, should be used if the use of a laxative is deemed advisable. A preparation of belladonna is frequently combined with it on purely theoretical grounds and without demonstrated advantage.

Extractum Aloes (Ext. Aloes), Extract of Aloes, N. F.

Dosage: 0.125 Gm. or 2 grains.

Aloinum (Aloin.), Aloin, U. S. P.—A pentosid or mixture of pentosids obtained from aloes.

Dosage: Purgative dose 0.015 Gm. or ¼ grain. In the treatment of chronic constipation aloin is frequently given in doses of from 0.005 to 0.02 Gm. of 1/12 to ⅓ grain, often in combination with extract of belladonna and strychnin. The advantage of these additions is doubtful. It may be taken after supper or at bedtime; if at bedtime, with plenty of water and a cracker, or at least with some food.

Alumen (Alum.), Alum, U. S. P.—Crystallized ammonium or potassium aluminum sulphate $NH_4Al(SO_4)_2+12H_2O$ or $KAl(SO_4)_2+12H_2O$.

Properties: Alum occurs as colorless crystals or a white powder without odor, but having a strongly astringent taste. It is freely soluble in water, practically insoluble in alcohol. It contains about 45 per cent. of water of hydration, which can be removed by heat, the product being exsiccated alum.

Incompatibilities: Alum is incompatible with alkalies and carbonates, which react with it with the formation of insoluble aluminum hydroxid. It is also incompatible with salts of lead because it precipitates the insoluble lead sulphate.

Action and Uses: Alum is astringent. It is seldom administered internally.

Dosage: Alum solution may be used as a gargle (from 1 to 5 per cent.) but it is somewhat injurious to the teeth; it may be given as an injection in gonorrhea (from 0.5 to 1 per cent.) and as a lotion in skin diseases (1 per cent.).

Alumen Exsiccatum (Alum. Exsic.), Exsiccated Alum, U. S. P.—A powder representing about twice its weight of the crystallized alum; it is sometimes used externally as a dusting powder or in the form of ointments.

Alumini Acetas, Aluminum Acetate.—Used principally in the form of:

Liquor Alumini Subacetatis (Liq. Alumin. Subacet.), Solution of Aluminum Subacetate, N. F.—Described in the National Formulary III under the name of Liquor Alumini Acetatis.

Properties: A clear, colorless solution, containing from 7.5 to 8 per cent. of basic aluminum acetate, having an acetous odor and a sweetish, astringent taste.

Action and Uses: Solution of aluminum subacetate is used extensively as a mild astringent and antiseptic. Because of the readiness with which this solution is decomposed it is advisable to dilute it with water only. For application to the skin it should be diluted from four to nine times.

AMMONIUM COMPOUNDS.—Ammonium compounds are divisible into two classes. In the first class the ammonium is combined with a strong acid such as hydrochloric or sulphuric. These form stable neutral salts which act largely by their salt action. In the second class belong ammonium hydroxid and carbonate. These compounds are unstable, decomposing readily with liberation of ammonia. Such compounds produce powerful local irritation and accompanying reflex effects by the action of the ammonia involved.

Ammonium salts, when injected into the circulation, stimulate the central nervous system, but they are so rapidly excreted or converted into urea that they cannot produce marked systemic action when taken by mouth, even though they are absorbed very readily. Their effects are, therefore, chiefly local. The expectorant action of the neutral salts, such as the chlorid, is probably due to mild irritation of the mucous membrane. With ammonium carbonate, this effect is reinforced by its alkaline reaction, through which it is supposed to increase the fluidity of mucus. All ammonium compounds used in medicine are soluble in water, and the carbonate and hydroxid have an alkaline reaction.

Ammonia.—NH_3. An irritating gas, soluble in alcohol, and in water, in which a part is converted into NH_4OH. Water of ammonia and the several preparations containing it are strongly alkaline.

Incompatibilities: It is incompatible with acids, neutralizing them and forming the salts of ammonium. It is also incompatible with the soluble salts of many metals because it precipitates from these solutions the hydroxids of the metals. Thus ammonia water with solution of ferric chlorid produces an insoluble precipitate of ferric hydroxid. Solutions of ammonia are also incompatible with the salts of alkaloids, from which they liberate the alkaloid.

Action and Uses: Ammonia internally in the form of water of ammonia or preferably of aromatic spirit of

ammonia is a stimulant, because the escaping ammonia irritates the mucous membranes of the nose and of the stomach and causes a reflex increase in the force of the heart and in the blood pressure. Little, if, any, of the gas is absorbed by the respiratory tract.

Externally, ammonia is used as a rubefacient, chiefly in form of the liniment. Applied in concentrated solution, especially if evaporation is prevented, it is apt to blister.

Aqua Ammoniae (Aq. Ammon.), Ammonia Water, U. S. P.—An aqueous solution, containing about 10 per cent. by weight of ammonia (NH_3). On standing, this solution loses ammonia and hence should be kept in well-stoppered bottles and should frequently be tested by the pharmacist. Ammonia water is a colorless liquid, having a very pungent, characteristic odor and a caustic, soapy taste. It is freely miscible with water and alcohol. Ammonia water is used chiefly for counterirritation in the form of:

Linimentum Ammoniae (Lin. Ammon.), Ammonia Liniment, U. S. P. (Volatile Liniment, Hartshorn Liniment).—A mixture of ammonia water 25 parts and a fatty oil 75 parts.

Ammonii Carbonas (Ammon. Carb.), Ammonium Carbonate, U. S. P.—Consists of a mixture of ammonium acid carbonate and ammonium carbamate.

Properties: It occurs as white, hard masses, having a strong odor of ammonia and a sharp, saline taste. On exposure to the air the salt loses both ammonia and carbon dioxid. Ammonium carbonate is slowly but freely soluble in water (1: 4), the ammonium carbamate being thereby converted into normal ammonium carbonate. Alcohol dissolves the carbamate and leaves the acid carbonate.

Incompatibilities: Ammonium carbonate is incompatible with acids, which decompose it, forming salts of ammonium and evolving carbon dioxid (CO_2). It precipitates the carbonate or the hydroxid of most metals and the insoluble alkaloids from solutions of their salts.

Action and Uses: Ammonium carbonate is largely decomposed (hydrolyzed) when dissolved in water, and its solutions are irritant to mucous membranes from the action of the ammonia set free. It is used by inhalation or in solutions as a reflex or diffusible stimulant in syncope, or arrest of respiration, and as a liquefying expectorant in bronchitis.

Dosage: 0.3 Gm. or 5 grains, dissolved in sufficient water (about one tablespoonful) to avoid too great irritation, which may result in nausea and vomiting. On the other hand, as the action of the remedy depends on its irritating qualities, it should not be too greatly diluted. Syrup of glycyrrhiza forms a suitable vehicle for it.

Spiritus Ammoniae Aromaticus (Sp. Ammon. Arom.), Aromatic Spirit of Ammonia, U. S. P.—A solution of ammonium carbonate with some free ammonia and aromatic oils in a mixture of distilled water with alcohol.

Action and Uses: A useful reflex stimulant, antacid and carminative, having the action and uses of ammonium carbonate combined with those of the alcohol and volatile oils.

Dosage: From 1 to 5 Cc. or 15 to 60 minims, freely diluted with water. As the stimulating action is of short duration, a moderate dose may be repeated in from fifteen minutes to half an hour.

Ammonii Chloridum (Ammon. Chlor.), Ammonium Chlorid, U. S. P.—NH_4Cl.

Properties: Ammonium chlorid usually occurs as a white, crystalline powder, without odor, having a cooling, saline taste. It is freely soluble in water (1: 2.6), and soluble in alcohol (1: 100), its aqueous solutions being neutral or very slightly acid to litmus.

Incompatibilities: Ammonium chlorid is incompatible with alkali hydroxids and carbonates, which liberate ammonia. It precipitates the insoluble chlorids of silver and of lead from solutions of the salts of those metals.

Action and Uses: Ammonium chlorid is used as an expectorant.

Dosage: From 0.31 to 1 Gm. (from 5 to 15 grains), repeated at least every two hours. It is probably best administered in a sour mixture as:

℞ Ammonii chloridi ..... 10 Gm.
Syrupi acidi citrici ..... 50 Cc.
Aquae ..... ad 100 Cc.
M. Sig.: A teaspoonful, freely diluted with water, every two hours.

To the preceding prescription codein may be added, if desired.

Amylis Nitris (Amyl. Nitris), Amyl Nitrite, U. S. P.—A liquid containing about 80 per cent. of $C_5H_{11}NO_2$ (chiefly iso-amyl nitrite). It should be kept in hermetically sealed glass bulbs or in dark, amber-colored, glass-stoppered vials, in a cool, dark place.

Properties: Amyl nitrite is a clear, yellowish liquid of a peculiar, ethereal, fruity odor and a pungent, aromatic taste. It is very volatile even at low temperatures, and is inflammable. It is practically insoluble in water, but miscible in all proportions with alcohol or ether.

Action and Uses: The "Nitrite Group," as used in medicine, comprises salts or esters of nitrous acid and certain organic nitrates which are reduced to nitrites in the organism. The chief members are amyl nitrite, sodium nitrite and glycerol nitrate (glyceryl trinitrate or nitroglycerin).

The characteristic action of this group is vasodilatation with a fall of the blood pressure. The members differ chiefly in the rapidity and duration of their effects, amyl nitrite being the quickest, though its action is of correspondingly short duration.

When given by inhalation, amyl nitrite produces almost instantaneous dilation of the peripheral blood vessels, shown by redness of the skin beginning in the head and neck, rapidly spreading over the body and sometimes extending to the lower extremities. This is promptly followed by dilatation of the splanchnic and other vessels so that the blood pressure soon falls. The lowered pressure increases the heart rate. There is a feeling of fulness in the head, often accompanied by headache. The breathing is rapid. With excessive doses or oversusceptibility, unconsciousness may supervene, and convulsions may occasionally occur after toxic doses. Large doses kill by respiratory paralysis. It may produce methemoglobin in the blood and cause the excretion of sugar in the urine. As much as 0.6 Cc. may generally be inhaled without dangerous results.

The effects of the medicinal administration of amyl nitrite are very transient. It is chiefly used to relax the spasm of the blood vessels in angina pectoris and in other painful affections in which there is reason to believe that the pain depends on arterial spasm. It is also employed to some extent to relieve spasm in epilepsy, sometimes averting an expected paroxysm.

Amyl nitrite is given to reduce the blood pressure in cases in which hemorrhage is due to the rupture of a blood-vessel in the lungs, brain or other organ in consequence of elevated blood pressure, but in hemorrhage with normal blood pressure it may do harm. It has been used with favorable results in bronchial asthma.

DOSAGE: 0.2 Cc. or 3 minims, by inhalation. It is conveniently carried in the form of glass pearls, each pearl containing a dose. When required the pearl is crushed in the handkerchief and the contents are inhaled.

Amylum (Amyl.), Starch, U. S. P. (Corn-Starch).—The starch grains obtained from the grain of *Zea mays*.

PROPERTIES: Starch occurs in the form of fine powder or irregular angular, white masses, insoluble in both water and alcohol, but swelling into a colloidal "paste" when boiled in water.

ACTION AND USES: Dry starch is used as a dusting and drying powder and also as a diluent for other more active substances. The gelatinous mass produced on boiling with water or glycerin is employed as an emollient and protective; as a cataplasm, and as an antidote to iodin poisoning. The starches from other cereals, from cassava and the potato have practically the same medicinal properties as cornstarch.

Antimonii et Potassii Tartras (Antim. et Pot. Tart.), Antimony and Potassium Tartrate, U. S. P. (Antimonyl Potassium Tartrate, Tartrated Antimony, Tartar Emetic). —A double salt of antimony and potassium with the radical of tartaric acid.

PROPERTIES: It occurs as a white powder or as colorless transparent crystals, becoming white and opaque on exposure to the air. It is soluble in water (1: 12), but practically insoluble in alcohol.

INCOMPATIBILITIES: It is incompatible with alkalies and their carbonates, tannic acid and vegetable astringents.

ACTION AND USES: Antimony and potassium tartrate, when applied to the skin, gives rise slowly to inflammatory changes, with pustules, followed by ulceration, which is somewhat difficult to limit. The ointment formerly employed as a pustulant counterirritant is now rarely used.

Internally antimony and potassium tartrate produces local irritation of the gastro-intestinal tract, and thereby nausea and vomiting with marked prostration. If absorbed, symptoms very similar to those produced by poisonous doses of arsenic are observed..

The therapeutic uses of antimony and potassium tartrate until recently were confined almost entirely to the treatment of the first stage of acute laryngitis and bronchitis. It should be avoided in cases marked by depression. When it its given, the object should be to increase secretion and facilitate the expulsion of sputum. The administration of antimony and potassium tartrate should not be carried beyond the production of slight nausea. For the production of vomiting other agents are preferable. Antimony preparations today are used almost exclusively in the treatment of certain diseases most frequently encountered in the tropics. The diseases that have been most favorably affected by antimony and potassium tartrate are: schistosomiasis (Bilharzia infections), kala-azar and granuloma inguinale, which also occurs in the United States. To be effective in these conditions, the drug must be administered intravenously.

DOSAGE: As an expectorant small doses should be used, beginning with 0.001 Gm. or 1/60 grain, which may be repeated hourly, taking care to avoid too great depression. The emetic dose is 0.03 Gm. or ½ grain. For intravenous administration, 1 per cent. solution in physiologic solution of sodium chlorid is used. The initial dose may be 0.04 Gm. or ⅔ grain.

Antipyrina (Antipyr.), Antipyrin, U. S. P. (Phenazone, Phenyldimethylpyrazolon).

PROPERTIES: Antipyrin occurs as a colorless, almost odorless, crystalline powder or tabular crystals having a slightly bitter taste. It is very soluble in water and freely soluble in alcohol (1: 1.3).

INCOMPATIBILITIES: Antipyrin is incompatible with spirit of nitrous ether, or other nitrites, tannic acid and tannic-acid-containing preparations. Mixed dry with sodium salicylate, it liquefies on standing.

ACTION AND USES: Antipyrin is an antipyretic and analgesic, acting similarly to acetanilid.

It is used for the relief of pain, chiefly when of a neuralgic character, also as an antispasmodic in pertussis. It is not suited to the treatment of the pain caused by inflammation.

Antipyrin is now seldom used as an antipyretic. Because of its rapid and at times erratic action it is not a safe ingredient of preparations sold directly to the laity. Locally, it is used sometimes as a hemostatic.

DOSAGE: 0.25 Gm. or 4 grains given with even greater caution than acetanilid and acetphenetidin. It is best administered alone in simple solution, or in powders, capsules or cachets.

Apomorphinae Hydrochloridum (Apomorph. Hydrochl.), Apomorphin Hydrochlorid, U. S. P.—The hydrochlorid of an artificial alkaloid prepared from morphin by the abstraction of one molecule of water.

PROPERTIES: Apomorphin hydrochlorid occurs as minute, white or grayish-white crystals, having a slightly bitter taste and acquiring a greenish tint on exposure to light and air. It is soluble (1: 50) in both water and alcohol. If the salt imparts at once an emerald-green color to 100 parts of water, it should be rejected. The amorphous form may contain dangerous impurities.

INCOMPATIBILITIES: It is precipitated by alkalies and the alkaloidal reagents. Solutions decompose rather readily.

ACTION AND USES: The chief action of apomorphin is on the vomiting center, resulting in the production of vomiting with its usual accompanying symptoms, including nausea with increase of saliva and other secretions, depression of the circulation, sweating, etc. It sometimes produces respiratory paralysis, even in small doses.

The drug is used chiefly as an emetic. For this purpose it has the advantage that it acts promptly and efficiently, and without local irritation of the stomach. It is therefore a useful emetic in poisoning, if the stomach tube cannot be employed. It has been advised for the expulsion of foreign bodies from the air passages. As an expectorant it is inferior to other nauseants.

It is said to be sometimes useful in asthma. Small doses (0.002 Gm., $\frac{1}{30}$ grain) are hypnotic, especially in acute alcoholism.

DOSAGE: The emetic dose is 0.005 Gm. or $\frac{1}{12}$ grain, given preferably by hypodermic injection. If no effect is produced, this dose may be repeated after ten minutes, but it should be remembered that in some cases apomorphin pro-

duces toxic effects without causing vomiting, and a dose of 0.004 Gm. or 1/15 grain is said to have produced death in a person enfeebled by chronic bronchitis; 0.012 Gm. or 1/5 grain may be given to robust patients at the first dose if the urgency of the case demands it, but care should be exercised in the use of these doses.

As an expectorant the proper dose is from 0.001 Gm. to 0.002 Gm. or from 1/60 to 1/30 grain, repeated every hour or two, with the avoidance of more than slight nausea. Syrup of citric acid is a good vehicle for it.

Aqua, Water, U. S. P.—Water used for medicines should be sterile; it is preferable to use:

AQUA DESTILLATA (AQ. DEST.), DISTILLED WATER, U. S. P.—A colorless, limpid liquid, without odor or taste, and perfectly neutral to the official indicators. For some purposes (in making solutions of arsphenamin, for example), it is essential that it be freshly distilled. Ordinary distilled water frequently is not sterile.

Argenti Nitras (Arg. Nit.), Silver Nitrate, U. S. P.—$AgNO_3$.

PROPERTIES: Silver nitrate occurs in colorless, tabular, rhombic crystals, becoming gray, or grayish black on exposure to light in the presence of organic matter. It is odorless and has a bitter, caustic, and strongly metallic taste. It is very soluble in water (1: 0.4) and soluble in alcohol (1: 30).

INCOMPATIBILITIES: Silver nitrate is incompatible with soluble chlorids, bromids and iodids, with which it forms the corresponding very insoluble salts of silver. It is also incompatible with soluble carbonates and hydroxids, which precipitate the oxid of silver, and with practically all organic drugs and reducing agents.

ACTION AND USES: Silver nitrate is an antiseptic and germicide, in solutions of a strength of 1: 1,000 destroying many micro-organisms, and in a strength of 1: 10,000 preventing their growth. Weak solutions are astringent to mucous membranes and strong solutions are caustic when applied to mucous membranes, denuded surfaces, and, in some cases, to the normal skin. It has been proposed for the treatment of gastric ulcer and to reduce the gastric secretion in hyperchlorhydria. Its internal use for some time may be followed by its deposition in the skin, producing the grayish discoloration known as argyria, which is incurable. Prolonged use should therefore be avoided.

Silver nitrate is used as a mild caustic to wounds, ulcers and exuberant granulations. It is applied as an astringent and antiseptic in catarrhal infections of the mucous membranes.

DOSAGE: As a caustic, silver nitrate is used in the form of fused silver nitrate. This should be moistened before use. To avoid blackening the fingers, it should be held with forceps or in a suitable holder. To parts difficult of access, it is often best applied fused to a probe.

In applications to mucous membranes the following strengths of solution in water are most suitable:

To the conjunctiva a strength of 4 per cent. may be applied in small quantity and the action stopped promptly by washing with a solution of sodium chlorid. This method of use is applicable to cases of severe conjunctivitis, especially those of gonorrheal origin.

For the prevention of gonorrheal conjunctivitis in the new-born a drop of 2 per cent. solution should be instilled into the eye as soon as practicable after delivery.

For other diseases of the conjunctiva, solutions varying in strength from 0.2 to 2 per cent. are sometimes used, but it is probable that other astringents are safer and quite as useful. Prolonged use may cause local argyria.

To the larynx, application is made of solutions containing from 2 to 10 per cent. of silver nitrate.

For the urethra, it is employed in the strength of from 1 : 10,000 to 1 : 2,000, and a 1 : 5,000 solution may be injected into the bladder. A solution of 1 : 100,000 may be used as an enema.

Solutions of silver nitrate should always be made with distilled water, and the mucous membranes to which they are to be applied should receive a preliminary cleansing to remove mucus, pus, food, etc., which might interfere with the action of the silver nitrate.

For the treatment of hyperchlorhydria and gastric ulcer, the salt may be given in pill form, preferably mixed with kaolin and massed with petrolatum. The average dose is 0.01 Gm. or ⅙ grain. This dose may also be given in solution. It is most efficient, however, when 100 or 200 Cc. of a solution of from 1 : 2,000 to 1 : 1,000 is used as a gastric douche, followed after two minutes by a solution of sodium chlorid which is then washed out of the stomach.

Argenti Nitras Fusus (Arg. Nit. Fus.), Molded Silver Nitrate, U. S. P. (Lunar Caustic, Fused Silver Nitrate).—A white, hard solid generally in the form of pencils or cones. A small amount of silver chlorid is added in the process for the purpose of toughening the mass.

Arseni Trioxidum (Arsen. Triox.), Arsenic Trioxid, U. S. P. (Arsenous Oxid, White Arsenic).—As_2O_3, formerly official as arsenous acid.

Properties: Arsenic trioxid occurs as an opaque, white powder or in irregular masses of two varieties, one amorphous, transparent and colorless like glass, the other crystalline, opaque and white, resembling porcelain. Arsenic trioxid is very slowly soluble in water (1: 30 to 1: 100) and practically insoluble in alcohol. It dissolves quite readily in solutions of acids or alkalies.

Incompatibilities: Solutions of arsenic are incompatible with salts of iron and of magnesium, lime-water and vegetable astringents.

ACTION AND USES: Arsenic trioxid applied to denuded or ulcerated tissue has a mildly caustic action which is quite painful. It has been used as a caustic, especially to malignant growths, but the painful character of the applications, the danger of absorption, and the uncertain extent of the destructive action have justly limited its use.

Taken internally, arsenic trioxid irritates the mucous membrane of the stomach and intestines. Toxic doses cause nausea, vomiting, colicky pains in the abdomen, a diarrhea of a watery character resembling that of cholera, and fatty degeneration of the liver and other internal organs. Large doses produce great depression, and collapse may ensue.

Arsenic is employed therapeutically in the treatment of neuralgia. It is thought to be especially adapted to cases of a periodic character. It is also used in the treatment of chorea. Larger doses, especially if long continued, may cause peripheral neuritis. Arsenic stimulates the action of the blood-forming organs, especially the bone marrow. It is considered useful in the treatment of pernicious anemia, leukemia and Hodgkin's disease. In these diseases it must be used in as large doses as can be borne. While improvement often occurs in these conditions under the use of arsenic, it is usually only temporary. In these conditions it is best administered in the form of solution of potassium arsenite (Fowler's Solution) or arsphenamin.

Many skin-diseases are favorably influenced by proper doses of arsenic. It acts by stimulating the skin, in such cases as usually require external stimulating applications. It is also of service in lesions due to disturbances of innervation in which the skin is usually poorly nourished. The following skin affections may be mentioned as likely to be benefited by arsenic: psoriasis, lichen planus, chronic eczema, pemphigus, dermatitis herpetiformis, chronic urticaria and disturbances of the sweat function. On the other hand, acute inflammatory conditions of the skin are made worse by arsenic. Arsenic has also been used in chronic respiratory affections, such as chronic bronchitis, emphysema, asthma, and tuberculosis. It may have some indirect benefit as a general tonic but much dependence cannot be placed upon it.

Arsenic is a powerful remedy against protozoal affections. These include malaria, syphilis and relapsing fever. In the form of arsenic trioxid it has been used successfully in malaria, particularly in the chronic form and in malarial cachexia. For the treatment of the other diseases mentioned it is employed in organic combination. See **Arsphenamina.**

DOSAGE: When used as a general tonic the dose may vary from 0.001 to 0.002 Gm. or 1/60 to 1/30 grain. In diseases of the blood the dosage should be regulated according to the effect, but it is well to use as large doses as the patient will tolerate. Arsenic may be used in increasing doses until symptoms of mild intoxication appear. One

may begin with 0.003 Gm. or 1/20 grain of arsenic trioxid three times daily, and increase by 0.001 Gm. or 1/60 grain three times daily. In using solution of potassium arsenite the initial dose may be 3 minims three times daily and increased by 1 minim three times daily. A slight toxic action is indicated by nausea, colicky pains or a puffiness under the eyes. The presence of albumin in the urine may also be observed. Such symptoms may make advisable the temporary withdrawal of the remedy, and its resumption in smaller doses.

Liquor Potassii Arsenitis (Liq. Pot. Arsen.), Solution of Potassium Arsenite, U. S. P. (Fowler's Solution, Liquor Arsenicalis Fowleri, P. I.).—An aqueous solution containing potassium arsenite, corresponding to about 1 per cent. of arsenic trioxid.

Dosage: 0.2 Cc. or 3 minims, increased to 1.0 Cc. or 15 minims, or even more.

This solution is often somewhat alkaline and is therefore incompatible with alkaloidal salts and the salts of certain metals.

Liquor Acidi Arsenosi (Liq. Acid. Arsen.), Solution of Arsenous Acid, U. S. P. (Hydrochloric Solution of Arsenic, "Solution of Arsenic Chlorid").—An aqueous solution containing the equivalent of 1 per cent. of arsenic trioxid with 5 per cent. of hydrochloric acid. Being acid, it may be used in combination with salts of metals or of alkaloids, with which the solution of arsenite, on account of its alkalinity, would be incompatible.

Dosage: 0.2 Cc. or 3 minims.

Arsphenamina, Arsphenamin, N. N. R., introduced under the trade name "Salvarsan."—Also known as "606" and by the trade names arsenobenzol and diarsenol. It is 3-diamino-4-dihydroxy-1-arseno-benzene hydrochlorid. Corresponds to 31.57 per cent. arsenic (As.).

Properties: Arsphenamin occurs as a yellow, crystalline, hygroscopic powder, very unstable in air, and hence marketed in ampules, each of which contains a dose, ranging from 0.1, 0.2, and up to 0.6 Gm. It is soluble in water, yielding a solution with an acid reaction.

Action and Uses: Arsphenamin is a specific remedy for syphilis in all stages, but is the more efficient the more recent the infection. It is especially indicated in the primary stage; in the later stages it should be given in repeated doses, in conjunction with mercurial courses. It is often efficient in mucous membrane lesions, and in cases of malignant syphilis which resist mercury.

Arsphenamin is also useful in various spirillar diseases such as relapsing fever, Vincent's angina, etc. In Vincent's angina local applications of the powder have been found useful, in addition to the intravenous administration. The drug administered intravenously cannot reach the spirilla embedded in the necrotic tissue of the throat.

ACCIDENTS: A rather common untoward result following intravenous injections is the so-called nitritoid crisis, which consists of flushing of the face, rapid pulse, and dyspnea. Nausea and vomiting, and precordial pain may be present; even syncope may occur. Edema of the lips and tongue, as well as congestion of the conjunctiva, have been noted. These symptoms usually occur while the drug is being injected but they may not appear until later, even the second or third day. They are obviously due to vasodilatation, and may be relieved by epinephrin, of which at least 0.5 mg. must be given intramuscularly the moment the symptoms appear. If relief is not obtained, the dose may be repeated at short intervals, and even increased, until facial pallor is produced.

Arsphenamin sometimes produces toxic results which are equivalent to poisoning by arsenic. These have occurred more commonly after the intramuscular injections. The intramuscular injection is painful and is usually followed by a tender, inflammatory nodule, which persists for some time. The intramuscular injection has now been practically discarded by syphilologists.

After intravenous injections certain nervous symptoms have frequently arisen which have received the name of neurorecidive (nervous relapse). The evidence seems to show that these nervous conditions are due not to the action of arsphenamin but to the increased activity of the spirochetes. They are best treated, therefore, by a specific remedy: another dose of arsphenamin or a compound of mercury. The optic neuritis which is so frequently produced by other preparations of arsenic has occurred very rarely in connection with arsphenamin. The drug has been employed successfully in all types of syphilitic eye disease. Repeated doses should be given.

DOSAGE: From 0.3 to 0.6 Gm., or 5 to 9 grains (0.1 Gm. to 18 Kg. (40 lbs.) of body weight).

For intravenous injection a clear alkaline solution is used. The contents of a tube should be used at once after opening and under no conditions should the contents of a tube, damaged in transportation, or any remnant of the powder from previously used tubes, be employed.

The ampules should be laid in 95 per cent. alcohol for fifteen minutes before opening, to detect leaks. They may be prepared as follows: For each 0.1 Gm. of arsphenamin use 20 Cc. of cold water; dissolve and add 0.9 Cc. of normal sodium hydroxid solution, and dilute to 30 Cc. Inject by gravity, using not less than two minutes per 0.1 Gm.

Special care should be taken to see that the water used in making the solutions is freshly distilled and completely sterile. Various forms of apparatus have been devised to facilitate intravenous injections. Of these, some form of graduated gravity pipet connected with a tube fitted with a three-way stop-cock seems most suitable.

In the treatment of syphilis of the central nervous system the Swift-Ellis method of intraspinal treatment is utilized at times. The technic is as follows: An injection of the usual dose of arsphenamin or neoarsphenamin is given intravenously. One hour after the injection 40 Cc. of blood are withdrawn by venipuncture. This is allowed to clot and left on ice for twenty-four hours. The serum is then pipetted off and centrifuged: 12 Cc. of this serum is usually added to 18 Cc. of sterile normal salt solution to make a 40 per cent. solution of arsphenamized serum, although it may be used without dilution. This is then heated for thirty minutes at 56 C. Before making the intraspinal injection a volume of spinal fluid equal to that of the injection is often withdrawn.

In tabes dorsalis the results from this method are, as a rule, more satisfactory than with the ordinary intravenous therapy. The pains have disappeared, the reaction in the cerebrospinal fluid has returned more or less completely to normal, and certain symptoms, such as diminution of bladder control and sexual power, which are usually looked on as fundamental phenomena, may disappear entirely or be greatly improved. Patients also feel better. In cerebrospinal syphilis also the intraspinal method has been used to a considerable extent. It is questionable, however, whether the results are much better than those of the intravenous method. In dementia paralytica the results of this method have been distinctly disappointing.

NEOARSPHENAMINA, NEOARSPHENAMIN, N. N. R.—Introduced under the trade name, "Neosalvarsan."—The name applied to a mixture of sodium 3-diamino-4-dihydroxy l-arsenobenzene-methanalsulphoxylate with inert, inorganic salts. The arsenic content of 3 parts neoarsphenamin is approximately equal to 2 parts of arsphenamin.

ACTION AND USES: Essentially the same as those of arsphenamin, although many observers claim better results from the latter. Neoarsphenamin differs from arsphenamin in that it dissolves readily in sterile water, making a neutral solution which can at once be injected. Water not warmer than from 20 to 22 C. (68 to 71.6 F.) should be used in dissolving the drug and the injections should be made at once, as neoarsphenamin oxidizes rapidly and becomes toxic.

DOSAGE: From 0.6 to 0.9 Gm., or 9 to 14 grains. This should be dissolved in cold water, using not less than 2 Cc. of water per 0.1 Gm. of drug. The time of injection should be not less than five minutes for the dose.

Asafoetida (Asafoet.), Asafetida, U. S. P. (Gum Asafetida).—Gum resin obtained from the roots of *Ferula asafoetida* and probably other species of *Ferula*.

PROPERTIES: A good quality of asafetida should contain not less than 60 per cent. of matter soluble in alcohol and should yield not more than 15 per cent. of ash. The gum of asafetida is freely soluble in cold or hot water and is present in sufficient amount to suspend in the form of a permanent emulsion the accompanying resin and volatile oil.

ACTION AND USES: Asafetida is used in the treatment of hysteria, acting probably by its odor. It is also carminative.

DOSAGE: 0.25 Gm. or 4 grains—preferably in pill form. In tympanites an emulsion may be used as an enema. The emulsion is made by triturating 4 Gm. of the drug with 100 Cc. of water until a uniform emulsion results. The strength may be varied to meet individual requirements.

Aspidium, Aspidium, U. S. P. (Male Fern).—The dried rhizome of several species of *Dryopteris;* used only in the form of:

OLEORESINA ASPIDII (OLEORES. ASPID.), OLEORESIN OF ASPIDIUM, U. S. P. (Oleoresin of Malefern).—An oleoresin prepared by extracting aspidium with ether, evaporating and recovering the solvent.

PROPERTIES: The most important constituent of male fern is filicic acid.

ACTION AND USES: Oleoresin of aspidium is used as a teniacide against ordinary tapeworm, but it is said to be more efficient against the *Bothriocephalus* than against ordinary tenias. Ordinarily the active constituents of aspidium are not absorbed and produce no symptoms except some nausea. If absorption occurs, violent symptoms of poisoning may ensue. These are vomiting and purging, weakness, spasms in the extremities, convulsions, stupor deepening into coma, and collapse. Disturbances of sight and hearing may occur, and permanent blindness sometimes follows. Jaundice has been observed.

DOSAGE: 2 Gm. or 30 grains is the dose stated in the Pharmacopeia, but most authorities recommend a larger dose. The dose should be proportioned to the strength and health of the patient. Robust males can take as much as 8 Gm. or 2 drams, while women should be given smaller doses and special caution should be exercised in administering the drug to anemic or debilitated persons. Children of 4 years may take 4 Gm. or 60 grains. A dose of 8 Gm. or 2 drams has been fatal to a child and 25 Gm. or 6 drams have several times proved fatal to adults.

Before this remedy is given, the alimentary canal should be emptied by a light diet or fasting for twenty-four hours and the administration of a saline cathartic in the morning before the anthelmintic is taken. The drug should be given early in the morning and is best prescribed in capsules, each containing 0.3 Gm., or 5 grains, to be taken at intervals of fifteen minutes until the full dose has been swal-

lowed. The last dose should be followed in three hours by a saline laxative. Castor oil or other fixed oils should not be given, because they favor the absorption of the active principle.

Atropina (Atrop.), Atropin, U. S. P.—An alkaloid obtained from *Atropa belladonna* and from other plants of the *Solanaceae*.

Properties: The alkaloid itself is only slightly soluble in water (1: 445), but freely soluble in alcohol (1: 2), and is usually prescribed in the form of one of its salts, which are readily soluble in water.

The salt most commonly used is:

Atropinae Sulphas (Atrop. Sulph.) Atropin Sulphate, U. S. P.—The sulphate of the alkaloid atropin.

Properties: Atropin sulphate occurs as a white, crystalline powder or microscopic crystals, which are odorless but have a very bitter, nauseating taste. Atropin sulphate is very soluble in water (1: 0.4) and in alcohol (1: 5).

Incompatibilities: Atropin sulphate is incompatible with alkalies and their carbonates. While no precipitate of the alkaloid would form, unless the solution were more concentrated than those ordinarily used in medicine, the alkaloid in the presence of alkalies is likely to be decomposed.

Solutions of the alkaloid are also incompatible with the general alkaloidal precipitants, such as tannic acid, iodin and potassium mercuric iodid, all of which precipitate compounds of the alkaloid, and with salts of mercury, which decompose it.

Action and Uses: Atropin and the related alkaloids depress or paralyze the endings of the vagus and other nerves of the parasympathetic system and of the nerves supplying the sweat glands.

Atropin checks the secretion of saliva so that the mouth and throat become dry. This dryness is due to some extent to a similar effect on the mucous secretions of the mouth, throat and nose. As an application of this action, the drug is occasionally used to check excessive secretion of saliva in ptyalism, mercurial salivation, etc. It is also used in coryza, especially in the first stage, to diminish the congestion and excessive secretion of the nasal mucus. It is held by some to be very useful in sore throat. It is used in case of excessive expectoration in bronchitis, bronchorrhea, etc. It also checks the secretion of saliva and mucus during anesthesia in operations on the throat, larynx, etc.

Atropin diminishes the secretion of hydrochloric acid by the stomach. It is given for this purpose, often as belladonna, in hyperchlorhydria, gastric ulcer, etc. While it has a decided effect on the secretion, its use should not

be continued for a long time. It checks the secretion of the pancreatic juice, or at least prevents the increase that follows the ingestion of physostigmin and other drugs, but does not prevent the action of secretin. It abolishes the secretion of that part of the bile which is under vagus control, but this action is probably unimportant. It is said not to affect the secretion of intestinal mucus.

Atropin relaxes spasm of the intestinal musculature and in small doses favors the normal peristalsis. It is therefore of service in spasmodic affections of the stomach and intestine. It may be prescribed in colic, painful spasms due to gastric, duodenal or intestinal ulcers, spastic constipation, etc. It is a serviceable anodyne in gallstone colic and may render the use of morphin unnecessary.

In small or moderate doses it acts as a respiratory stimulant, but very large doses cause respiratory paralysis. It may be employed with good effect in cases in which the respiration is embarrassed from other than mechanical agents. It is used for this purpose in morphin poisoning, but it should be administered with great care on account of the respiratory depression caused by large doses. To obviate the effect of morphin on the respiration, it is given with the latter drug in hypodermic injections. It has also been given with morphin as a preliminary to anesthesia by ether; in such cases it also serves to lessen the salivary and bronchial secretions and tends to prevent vomiting.

By paralyzing the vagus endings atropin increases the rapidity of the heart beat. Its depressant action on the vagus is made use of in the diagnosis of certain disturbances of the cardiac rhythm, particularly bradycardia. If the slow pulse is due to an organic lesion of the conducting mechanism (heart block), it will persist in spite of the action of atropin, but if it is due to vagal stimulation, an increased rate usually results from an effective dose.

Atropin in moderate doses relaxes the blood vessels of the skin so that the skin, especially of the face and upper extremities, becomes red, sometimes showing an eruption closely resembling that of scarlet fever. In larger doses it contracts the vessels of the splanchnic area and raises the blood pressure. In still larger doses a general fall of blood pressure occurs, accompanied by a very rapid and feeble pulse. It is not, however, an essential heart tonic.

The secretion of sweat is reduced by atropin. It is used for the suppression of night sweats, especially in pulmonary tuberculosis. A single dose given at night may be followed the next night by a larger dose if the first was not successful. The use of atropin for this purpose should be deferred as long as practicable and discontinued as soon as may be on account of its disturbing influence on digestion.

Atropin produces dilatation of the pupil, paralysis of the accommodation and consequent disturbance of vision by a local action on the oculomotor nerve endings in the iris. When the drug is taken internally the effect is due to the

atropin circulating in the blood, and is bilateral. When the drug is applied locally the action is unilateral unless some general absorption takes place or some of the solution is introduced into the other eye by accident.

To produce these actions on the eye, atropin is employed in solution dropped into the conjunctival sac for the purpose of facilitating the examination of the eye with the ophthalmoscope. The dilatation of the pupil also serves as a diagnostic measure in case of iritis as the pupil dilates irregularly in this disease. The wide dilatation of the pupil also tends to prevent its adhesion to the cornea or lens.

Sufficient absorption may take place from lotions dropped into the conjunctiva to produce general symptoms and even to cause toxic effects. Atropin may also provoke acute glaucoma.

Atropin is sometimes used externally in the form of ointment of belladonna for the relief of neuralgias, especially those in which pain results from local conditions of the nerve or surrounding tissues. It has been recommended for local use in the rectum to relieve the pain of hemorrhoids or fissure, for which purpose it is commonly prescribed in the form of suppositories. It is an old remedy for enuresis, but must be regarded in most cases as a purely empirical treatment to be used after investigation has shown the absence of organic lesions which may be remedied in other ways. It is used for vesical spasm due to irritable neck of the bladder.

While the influence of atropin on the secretion of milk is not established, it is quite generally used locally in mammitis, galactorrhea and when it is desired to check the secretion.

Dosage: Average 0.5 mg. or $\frac{1}{120}$ grain. Whenever it is used for any one of these purposes, the appearance of some of the other effects of the drug constitute "untoward actions." Unpleasant symptoms of this kind are produced in some people by the average dose stated. It is best, therefore, to begin with half this dose, 0.25 mg. or $\frac{1}{250}$ grain. Such dose may be repeated every two hours until distinct effects are produced. For the effect on the stomach the drug should be given in solution about fifteen minutes before the meal. For effect on night sweats it is given at bedtime. In cases of pylorospasm of infants, it may be injected hypodermically or given in feeding in doses of 0.05 mg. to 0.1 mg. or $\frac{1}{1000}$ to $\frac{1}{500}$ grain.

When atropin is being administered the patient or his friends should be warned of the possible appearance of slight toxic symptoms, the first indication of which is usually dryness of the throat. Some dimness of vision is also likely to be experienced.

Serious poisoning usually begins with rapid pulse, flushing of the skin, talkative delirium, marked dilatation of the

pupils, some elevation of the temperature and dryness of the throat and skin. This is followed more or less quickly by unconsciousness, prostration, paralysis of the voluntary muscles and marked vasomotor paralysis.

Balsamum Peruvianum (Bals. Peruv.), Balsam of Peru, U. S. P. (Peru Balsam).—A balsam obtained from a tree, *Toluifera pereirae.*

PROPERTIES: Balsam of Peru occurs as a viscid, dark brown liquid that does not harden on exposure to air. It contains resins and traces of cinnamic and benzoic acids.

ACTION AND USES: Balsam of Peru is not used internally, but is sometimes applied in ointment or in the form of alcoholic solution or mixed with castor oil or even undiluted as a stimulant to indolent wounds and ulcers to promote the formation of granulations and the process of cicatrization. Balsam of Peru is also used as a parasiticide in diseases of the skin, such as scabies.

In scabies a 4 per cent. petrolatum ointment of balsam of Peru, with the same amount of sulphur, chalk and green soap may be used. It should be applied freely at night and in the morning over all of the affected areas. The strength of this mixture can be doubled in obstinate cases. Balsam of Peru can be painted over portions of the body at night, followed by a bath in the morning. In rare instances, balsam of Peru produces violent dermatitis. Extensive application may be followed by renal irritation.

Balsamum Tolutanum (Bals. Tolu.), Balsam of Tolu, U. S. P. (Tolu Balsam).—A balsam obtained from *Toluifera balsamum.*

PROPERTIES: Balsam of Tolu occurs as a yellowish-brown or brown plastic solid, becoming brittle when old, dried or exposed to cold. It is very soluble in alcohol, but nearly insoluble in water.

The use of balsam of Tolu in medicine is largely restricted. It is one of the ingredients of compound tincture of benzoin. It is chiefly employed as a flavor or pleasant vehicle, especially for expectorants, in the form of:

SYRUPUS TOLUTANUS (SYR. TOLU.), SYRUP OF TOLU, U. S. P.—A solution of the aromatic constituents of balsam of Tolu in syrup.

DOSAGE: 15 Cc. or 4 fluidrams.

Barbital, Barbital, N. N. R. (Diethyl-Barbituric Acid, Diethyl Malonyl Urea, Malourea, Veronal).—2, 4, 6-Trioxyl-5-diethyl pyrimidin, a ureid derived from diethylmalonic acid.

PROPERTIES: Barbital occurs as a white, crystalline powder, odorless, and having a faint, bitter taste. It is slightly soluble in water (1:150) and freely soluble in alcohol (1:8).

ACTIONS AND USES: Barbital is quickly absorbed, especially when it is given in solution. Suitable doses induce sleep, apparently without any other effect. The hypnotic action begins in about half an hour after its administration. In larger doses the temperature falls and animals show trembling and restlessness in their sleep. Many cases of poisoning, some fatal, occur from its indiscriminate use by the laity. The symptoms are long-continued stupor, sometimes interrupted by excitement; the condition has been confused with uremia, epidemic encephalitis and opium poisoning. Skin rashes are of frequent occurrence.

DOSAGE: 0.3 to 0.6 Gm. or 5 to 10 grains, best prescribed in form of powder to be given in hot fluid, such as hot milk, half an hour or an hour before bed time. Pills or tablets should be crushed before swallowing to insure absorption.

SODII BARBITAL, BARBITAL-SODIUM, N. N. R. Sodium Diethyl-Barbiturate, N. N. R. Also known as veronal-sodium, is the monosodium salt of diethyl-barbituric acid.

PROPERTIES: Sodium diethyl-barbiturate occurs as a white, crystalline powder, odorless, and having an objectionably bitter, alkaline taste. It is freely soluble in water (1: 5).

ACTION AND USES: Barbital-Sodium has the same properties as Barbital, but is more soluble.

DOSAGE: 0.3 to 0.6 Gm. or 5 to 10 grains.

Belladonnae Folia (Bellad. Fol.), Belladonna Leaves, U. S. P. (Deadly Nightshade Leaves, Belladonnae Folium, P. I.). —The dried leaves of *Atropa belladonna,* yielding, by the process outlined in the Pharmacopeia, not less than 0.3 per cent. of the total alkaloids from belladonna leaves.

ACTION AND USES: The active principles of belladonna act like atropin (which see).

TINCTURA BELLEDONNAE FOLIORUM (TR. BELLAD. FOL.), TINCTURE OF BELLADONNA LEAVES, U. S. P.—One hundred Cc. represents about 10 Gm. of the drug.

INCOMPATIBILITIES: The tincture should not be prescribed with alkalies.

DOSAGE: 0.75 Cc. or 12 minims, representing approximately 0.2 mg. or 1/300 grain of mydriatic alkaloids.

EXTRACTUM BELLADONNAE FOLIORUM (EXT. BELLAD. FOL.), EXTRACT OF BELLADONNA LEAVES, U. S. P.—A hydroalcoholic extract of belladonna leaves in either a pilular or a powdered form. One gram represents about 4 Gm. of belladonna leaves.

DOSAGE: 0.015 Gm. or 1/4 grain, corresponding approximately to 0.2 mg. or 1/300 grain of mydriatic alkaloids.

ACTION AND USES: The application of extract of belladonna to the skin secures a local anodyne effect which is employed for the relief of rheumatic and neuralgic pains and soreness. It is a serviceable application in acute inflammatory conditions.

EMPLASTRUM BELLADONNAE (EMP. BELLAD.), BELLADONNA PLASTER, U. S. P.—An adhesive plaster representing approximately 30 per cent. of extract of belladonna. Plasters are not commonly made by pharmacists, but are supplied already spread by the manufacturers. They are usually prescribed by the size, according to the area of skin to be covered.

UNGUENTUM BELLADONNAE (UNG. BELLAD.), BELLADONNA OINTMENT, U. S. P.—An ointment containing 10 per cent. of extract of belladonna in a mixture of hydrous wool fat and benzoinated lard.

Benzoinum (Benzoin.), Benzoin, U. S. P.—A balsamic resin obtained from several species of *Styrax* trees growing in the East Indies. The drug is now official as Sumatra Benzoin and Siam Benzoin.

PROPERTIES: Benzoin contains benzoic acid (Siam benzoin), cinnamic acid (Sumatra benzoin) and resins which are soluble in alcohol and to some extent at least in oils and fats.

TINCTURA BENZOINAE COMPOSITA (TR. BENZ. CO.), COMPOUND TINCTURE OF BENZOIN, U. S. P.—A mixture of the alcohol-soluble constituents of benzoin, 10 Gm.; aloes, 2 Gm.; storax, 8 Gm., and balsam of Tolu, 4 Gm., in sufficient alcohol to make 100 Cc.

ACTION AND USES: Compound tincture of benzoin is used as an application to the inflamed mucous membrane of the throat and bronchi by inhalation. It is soothing and acts as a stimulating expectorant. It is frequently administered by adding a teaspoonful to a glassful of boiling water and inhaling the vapor. It is also used as an addition to lotions of glycerin and water. It is useful as a stimulant and protective for ulcers, bedsores, cracked nipples and fissures of the lips, anus, etc.

Benzosulphinidum (Benzosulphinid.), Benzosulphinid, U. S. P. (Saccharin, Glusidum).—The anhydrid, $C_6H_4SO_2.CONH$, of ortho-sulphamid-benzoic acid (Benzosulphonic-imid).

PROPERTIES: Benzosulphinid is a white, crystalline powder, nearly odorless, having an intensely sweet taste even in dilute solutions. It is soluble in alcohol (1: 31), but only slightly soluble in water (1: 290). The addition of an alkali materially increases the solubility of saccharin in water by the formation of a salt, and it is often prescribed mixed with an equal quantity of sodium bicarbonate or in the form of a sodium salt known as "soluble saccharin."

ACTION AND USES: Benzosulphinid is used as a substitute for sugar in diabetes. It is about 500 times as sweet as sugar, the usual quarter-grain tablet being about equal to a large "lump" of sugar. However, it tends to become dis-

tasteful on continued use. It is excreted almost unchanged, and does not produce any marked pharmacologic effect. It has no food value, therefore its substitution for sugar in ordinary food lowers the nutritive value. Saccharin is rendered more soluble by the addition of an equal weight of sodium bicarbonate.

Betanaphthol (Betanaph.), Betanaphthol, U. S. P. (Naphthol).—A monohydroxyphenol ($C_{10}H_7OH$) of the naphthalene series.

PROPERTIES: It occurs as colorless, or pale buff-colored, crystalline laminae or a crystalline powder, having a faint phenol-like odor and a pungent taste. It is only very slightly soluble in water (1:1,000), but is very soluble in alcohol (1: 0.8).

ACTION AND USES: Betanaphthol is a powerful antiseptic, several times stronger than phenol. It is irritating to the skin or mucous membranes when applied in solution. If absorbed in considerable amount it may cause nephritis. It tends to destroy the red blood corpuscles and has been known to produce changes in the retina and opacity of the lens.

Betanaphthol is applied externally as a parasiticide and antiseptic. Internally it has been much used as an intestinal antiseptic, but its utility is limited because of the danger of poisonous consequences from its possible absorption. It has also been used as an anthelmintic for the treatment of hookworm disease.

DOSAGE: 0.1 to 0.3 Gm. or 1½ to 5 grains. It is best given diluted with an inert substance, such as sugar of milk, in powder or capsules. Externally it may be used in the form of ointment, 1 to 10 per cent.

Bismuthi Subcarbonas (Bism. Subcarb.), Bismuth Subcarbonate, U. S. P.—A basic carbonate of bismuth of varying chemical composition, some specimens being more basic than others.

PROPERTIES: Bismuth subcarbonate is practically insoluble in water or alcohol. It is decomposed by hydrochloric or nitric acid, giving a copious effervescence of carbon dioxid and producing a chlorid or nitrate of bismuth which enters into solution. When such a solution is diluted with water the insoluble basic chlorid (oxychlorid or subchlorid) or basic nitrate of bismuth is precipitated. Bismuth subcarbonate is readily decomposed by the acid of the gastric juice, but in this case while the acid is neutralized, an insoluble oxychlorid of bismuth remains, coating the stomach and thus acting therapeutically in the same manner as the original subcarbonate would.

INCOMPATIBILITIES: It is incompatible with sulphids, sulphur, acids and acid salts.

ACTION AND USES: Bismuth subcarbonate acts like other insoluble salts of bismuth; and as antacid. For its uses see **Bismuthi Subnitras.** In roentgenography the subcarbonate is preferable to the subnitrate because of the fact that it cannot give rise to nitrite poisoning, which has occasionally happened when large doses of the subnitrate were used. Barium sulphate, however, has largely replaced the bismuth salt in roentgenography.

DOSAGE: 0.5 to 2 Gm., 8 to 30 grains. Much larger doses are necessary in roentgen-ray work.

Bismuthi Subgallas (Bism. Subgall.), Bismuth Subgallate, U. S. P.—A basic gallate of bismuth of varying chemical composition, containing bismuth equivalent to from 52 to 57 per cent. of bismuth oxid.

PROPERTIES: Bismuth subgallate occurs as an amorphous, bright yellow powder without odor or taste. It is practically insoluble in water and in alcohol, but is decomposed by hydrochloric, nitric or sulphuric acid if heated. It is also decomposed by alkali hydroxids.

INCOMPATIBILITIES: Bismuth subgallate is incompatible with acids, alkalies, sulphids and sulphur.

ACTION AND USES: Bismuth subgallate was introduced for the treatment of skin diseases. Its action and uses are similar to those of Bismuth subnitrate, which see.

DOSAGE: 0.25 Gm. or 4 grains.

Bismuthi Subnitras (Bism. Subnit.), Bismuth Subnitrate, U. S. P.—A basic bismuth nitrate of varying chemical composition.

PROPERTIES: Bismuth subnitrate occurs as a heavy, white, odorless and almost tasteless powder. It is practically insoluble in water and in alcohol. Hydrochloric acid of the usual strength of the gastric juice decomposes only a small amount in the course of several hours. Hydrochloric or nitric acid, if not too dilute, decomposes bismuth subnitrate, producing the chlorid or nitrate, which enters into solution; but when this solution is diluted with water the insoluble basic chlorid (oxychlorid or subchlorid) or basic nitrate (subnitrate) is precipitated.

INCOMPATIBILITIES: Bismuth subnitrate is incompatible with acids, tannins, sulphids and sulphur. With soluble carbonates and bicarbonates in the presence of water there is a liberation of carbon dioxid, a formation of insoluble bismuth compound, and the nitrate of the alkali metal. Hence, when bismuth is desired as an addition to a solution of alkali, the subcarbonate should be used. With iodids a double decomposition has been noted with the formation of the red basic iodid of bismuth and the nitrate of the metal whose iodid was used.

ACTION AND USES: Soluble bismuth compounds, as a rule, become converted in the presence of water into insoluble basic compounds. Most of the preparations used in medicine are already in the basic form. (As the action of bismuth preparations depends on the action of an insoluble powder, there is no object in prescribing a soluble salt.) All the insoluble compounds of bismuth used in medicine produce essentially the same effects. They are best administered in the form of powders, capsules or cachets. The salt most frequently used is bismuth subnitrate; but since this sometimes produces poisonous

effects, the subcarbonate is preferable. Under some circumstances the nitrate radical may be reduced to nitrite, especially by the putrefactive bacteria of the large intestine. Poisoning by nitrites is indicated by vasomotor paralysis, tachycardia and asphyxia due to the formation of methemoglobin.

Bismuth subnitrate is not appreciably affected by the gastric juice and does not materially lessen its acidity. When given in considerable doses it coats the mucous membrane and acts as a mechanical protective. It thus prevents the action of the digestive secretions and of irritating foods or other substances on the mucous membrane. The same is true of its effect on the mucous membrane of the intestine. It is not absorbed in the stomach. It undergoes chemical changes in the intestine and is probably absorbed there to some extent though seldom in sufficient quantities to produce symptoms of poisoning. It is excreted by the kidneys and mouth, as well as by the cecum and other parts of the large intestine. It is turned black in the large intestine, probably from contact with sulphids.

When applied to the skin it acts mechanically, but on wounds and ulcers, as on mucous membranes, it acts as a protective, astringent and antiseptic. It is absorbed from wounds to a larger extent than from mucous membranes. A number of cases of poisoning have been so caused.

Bismuth subnitrate and other insoluble salts of bismuth are used in irritation of the stomach and intestines for their protective and astringent powers. They are useful to allay vomiting from gastric irritation. In the same manner they serve to check diarrhea. They are useful in hyperacidity and ulcer of the stomach by coating and protecting the mucous membrane. They are also employed in catarrh of the stomach and intestines. They may be given for the same purpose in ulcerative enteritis.

Externally the subnitrate and subcarbonate are used as protective and antiseptic applications in skin diseases and as applications to ulcers or suppurating wounds and to promote the healing of old sinuses and fistulous tracts. In the latter case the bismuth is used in the form of a paste (33 per cent.) combined with petrolatum and wax. A number of cases of poisoning have been reported due to the absorption of the bismuth from such application. Hence care must be exercised in its use and on the appearance of toxic symptoms, such as a blue line on the gums, headache, nausea and stomatitis, the bismuth should be removed from the fistula by the injection of warm olive oil.

Dosage: 1 Gm. or 15 grains. For the treatment of peptic ulcer or in intestinal disease this dose may be frequently repeated (every 3 to 6 hours). Externally it is employed freely as a dusting powder or in ointment.

Caffeina (Caffein.), Caffein, U. S. P.—A feebly basic substance obtained from the leaves of *Thea sinensis* or from the seeds of *Coffea arabica* and also found in other plants. Tea contains from 1 to 4 per cent. of caffein; coffee from 1 to 2 per cent.

PROPERTIES: Caffein is trimethyl-xanthin, $C_5H(CH_3)_3N_4O_2$. It occurs as white, silky, glistening needles, usually matted together in fleecy masses, odorless and having a bitter taste. It is soluble in water (1: 46) and in alcohol (1: 66). The solubility in water is materially increased by the addition of sodium benzoate or sodium salicylate.

ACTION AND USES: Small doses of caffein act on the nervous system, stimulating the psychic centers, the respiratory and vasomotor centers and the reflexes. It modifies the circulation by stimulating the heart and relaxing the vessels by direct action. The flow of urine is increased. Muscular contraction is facilitated and fatigue lessened. Excessive doses produce insomnia, nervousness, headache, palpitation and nausea or vomiting, especially in susceptible persons. They lessen the capacity for mental or muscular work. Toxic doses may produce tetanic convulsions and cardiac dilatation.

ACTION ON THE CIRCULATION: Caffein has a rather complex and, therefore, somewhat inconstant action. In therapeutic doses the pulse may be quickened or slowed. The blood-vessels tend to dilate by the peripheral action and to contract by the central action. The dilatation probably predominates in the kidney in most cases, but the blood-pressure may rise slightly by increased force and output of the heart. This increased output and lessened resistance tend to produce a more rapid flow of blood, and this results in an increased flow of urine. These effects make caffein especially efficient in some cases of cardiac dropsy, although it is generally inferior to digitalis. The cardiac stimulation is also useful in temporary cardiac weakness.

Caffein is considered by some clinicians a most valuable drug for the treatment of circulatory failure in acute infectious processes, such as pneumonia, peritonitis, scarlet fever, etc. On the other hand, some authors do not approve of the use of caffein as a cardiac remedy, but believe that its utility is confined to its diuretic action. A disadvantage in the use of large doses is the cerebral stimulation produced, which often prevents sleep.

Caffein is useful in collapse by causing rise of blood-pressure and stimulating the respiration. It may be used in narcotic poisoning in the form of hot coffee, which may be administered by rectum, if the stomach is to be washed out meanwhile. It is especially valuable in opium poisoning, and it may be used in alcohol poisoning on the same principle. It relieves some forms of headache, but in the congestive form it may increase the difficulty. It is excreted by the kidney partly under its own form, partly as mono- or dimethyl-xanthin. It does not increase the amount of uric acid in the urine.

DOSAGE: The dose of caffein varies from 0.06 Gm. to 0.3 Gm., or about 1 to 5 grains. A cup of the beverage made from a tablespoonful (15 Gm.) of ground coffee would contain from 0.1 to 0.2 Gm. or from 1½ to 3 grains of caffein. The alkaloid may be given in the form of powder or in capsules or cachets. Caffein sodiobenzoate should be chosen for hypodermic use.

CAFFEINAE SODIO-BENZOAS (CAFF. SOD. BENZ.), CAFFEIN SODIO-BENZOATE, U. S. P.—A mixture of equal parts of caffein and sodium benzoate.

PROPERTIES: It is freely soluble (1:1) in water and soluble in alcohol (1:30). It is well adapted for administration in solution either by mouth or hypodermically.

DOSAGE: 0.1 to 0.6 Gm. or about 1.5 to 10 grains.

Calcii Carbonas Praecipitatus (Calc. Carb. Praec.), Precipitated Calcium Carbonate, U. S. P. (Precipitated Chalk).—Calcium carbonate, $CaCO_3$, obtained by precipitating a solution of a salt of calcium by a soluble carbonate, collecting and washing the precipitate and drying.

PROPERTIES: Precipitated calcium carbonate is a fine white powder without odor or taste. It is practicallly insoluble in water, but dissolves to a considerable extent in water containing carbon dioxid. It is decomposed by acids, forming a salt of calcium and giving off carbon dioxid with effervescence.

ACTION AND USES: Calcium carbonate neutralizes the acid of the gastric juice, calcium chlorid being formed and absorbed to some extent. If the stomach contains no acid it may escape solution and absorption. When absorbed the action is that of the soluble salts of calcium, which will be described under Calcium Chlorid.

Calcium carbonate is used chiefly as an antacid. For this purpose and as detergent it is employed as the base of many tooth-powders. It is given in the form of powder as an antacid and protective in gastritis, hyperchlorhydria and gastric ulcer. In prescribing it for such affections its constipating tendency should be borne in mind. It is especially appropriate to cases in which there is hyperacidity with accompanying diarrhea and in diarrhea with acid fermentation. It may be used in skin diseases as a dusting powder to neutralize acid secretions and to protect the skin.

Calcium carbonate is the appropriate antidote to oxalic acid as it neutralizes the acid with the formation of the insoluble oxalate of calcium. It may be used as an antidote to other corrosive acids, though magnesium oxid is preferable, as it does not yield gas on reaction with acid.

DOSAGE: From 1 to 3 Gm. or from 15 to 45 grains. Teaspoonful doses can be given without fear of harm. One gram will neutralize 0.730 Gm. of absolute HCl, or approximately the amount of free HCl in 500 Cc., or 1 pint of stomach contents having 40 degrees of free acidity.

Calcii Chloridum (Calc. Chlor.), Calcium Chlorid, U. S. P.—A hydrated form of calcium chlorid containing not less than 75 per cent. of $CaCl_2$.

PROPERTIES: Calcium chlorid occurs as white, translucent fragments, which are odorless and have a sharp saline taste. It is very deliquescent and should be kept in well-stoppered bottles. It is freely soluble in water (1: 1.2) and also in alcohol (1: 10).

INCOMPATIBILITIES: Soluble carbonates, phosphates and sulphates produce a precipitate of the corresponding insoluble salts of calcium.

ACTION AND USES: Calcium salts depress the entire muscular and nervous system, when applied directly to these tissues, or injected into the blood stream. If the calcium concentration of the serum is normal, calcium salts administered by mouth or even intravenously are not absorbed or rapidly excreted. The soluble salts are converted in the intestine into the insoluble carbonate or phosphate or into soaps. When the calcium concentration of the serum is low, as in infantile tetany, the continued administration of soluble calcium salts, especially the chlorid, will raise the concentration to a greater or less extent and cause a cessation of symptoms. But unless the cause of the condition is removed, the concentration sinks rapidly after withdrawal of the calcium.

Calcium is believed to diminish inflammatory effusions and appears to be of some benefit in urticaria and serum rashes.

There are grounds for believing that calcium diminishes or prevents some of the unpleasant reactions from arsphenamin.

Calcium bromid appears to be somewhat more effective against epilepsy than the other bromids.

The importance of calcium in blood coagulation has led to its use in hemorrhagic conditions, such as hemophilia. purpura, the intestinal hemorrhage of typhoid fever, etc. It is very improbable that it could be effective, since the blood in these conditions always contains an abundance of calcium. Both the experimental and the best clinical evidence fail to establish its efficacy.

DOSAGE: From 0.5 to 1.0 Gm. or from 8 to 15 grains. Calcium chlorid is best administered in dilute solution sweetened with syrup or elixir.

Calcii Lactas (Calc. Lact.), Calcium Lactate, U. S. P.—The hydrated form of calcium lactate. Contains when dried to constant weight not less than 98 per cent. of $Ca(C_3H_5O_3)_2$.

PROPERTIES: Calcium lactate occurs in white crystalline masses or powder, odorless and nearly tasteless. It is soluble in water (1: 20), but very slightly soluble in alcohol.

INCOMPATIBILITES: Calcium lactate is incompatible with carbonates, sulphates and other compounds forming insoluble calcium salts.

Action and Uses: Calcium lactate has the pharmacologic action of other soluble calcium salts (see **Calcium Chlorid**) but is less irritating than the chlorid and, therefore, especially suitable for hypodermic use.

Dosage: From 1.0 to 2.0 Gm. or from 15 to 30 grains.

Calx, Calcium Oxid, U. S. P. (Lime, Quicklime).—Contains when freshly ignited not less than 95 per cent. of CaO.

Properties: Calcium oxid occurs as hard, white or grayish-white masses, which, in contact with the air, gradually attract moisture and carbon dioxid and fall to a white powder; it is odorless and has a caustic taste. Calcium oxid is converted into calcium hydroxid on the addition of water, and this is slightly soluble in cold water (1: 840), less soluble in hot water and practically insoluble in alcohol.

Milk of lime is calcium hydroxid mixed with water in the proportion of 1 quart of lime to 4 of water.

Action and Uses: Quicklime is a fairly active germicide. On account of its cheapness it is much used as a disinfectant. It is especially useful for the disinfection of excreta. Freshly prepared milk of lime may be added in volume equal to that of the material to be disinfected, the mass thoroughly mixed and allowed to stand for two hours before disposal. A still better method of using it is to add enough quicklime to make the excrement boil. Milk of lime or whitewash is a serviceable application to privies or to the walls of infected rooms.

Liquor Calcis (Liq. Calc.), Solution of Calcium Hydroxid, U. S. P. (Lime-water).—A saturated solution of calcium hydroxid containing about 0.14 per cent. of $Ca(OH)_2$.

Properties: Lime-water is a clear, colorless liquid without odor, and has an alkaline, bitter taste. Lime-water absorbs carbon-dioxid from the air, readily forming the insoluble calcium carbonate, and leaving the solution weaker in consequence. The Pharmacopeia gives a convenient method of assay, and there is no excuse for the pharmacist who dispenses an inferior preparation. The strength of lime-water should be preserved by keeping an excess of lime in the bottom of the container. When the lime-water is to be used the clear supernatant liquid should be decanted.

Incompatibilities: Lime-water is incompatible with acids and with carbonated, or ordinary hard water.

Action and Uses: Lime-water is antacid and astringent and is often used as an addition to milk for both adults and children, to favor fine curdling. The usual proportion is 1 of lime-water to 4 of milk, but a mixture of equal parts may be given. This is administered in small doses to allay nausea and vomiting, as well as diarrhea. Lime-water is used externally in the treatment of burns.

Dosage: 15 Cc. or about 4 fluidrams, containing approximately 0.02 Gm. or ⅓ grain of calcium hydroxid.

Calx Chlorinata (Calx Chlorin.), Chlorinated Lime, U. S. P. (Chlorinated Calcium Oxid, Bleaching Powder, often improperly called "Chlorid of Lime").—A variable compound resulting from the action of chlorin on calcium hydroxid. It should contain not less than 30 per cent. of available chlorin, that is, chlorin which is set free by the action of an acid.

PROPERTIES: Chlorinated lime occurs as a white or grayish-white granular powder, having a chlorin-like odor, and a repulsive saline taste. It is only partially soluble in water or alcohol.

ACTION AND USES: Chlorinated lime is a disinfectant. A 5 per cent. solution is a convenient strength for ordinary use. It is being used quite extensively as the source of chlorin for treating contaminated drinking waters. The fresh solution of about 0.5 per cent. strength should be added to the water to be treated, in the proportion of about 25 gallons per million gallons of water, the proportion varying with different waters.

Hypochlorites in acid, alkaline and slightly alkaline solutions have been found useful in the treatment of infected wounds.

The acid solution (Lorrain Smith's) "Eusol" may be prepared by shaking 12.5 Gm. of chlorinated lime and 12.5 Gm. powdered boric acid with 1 liter of water, allowing the mixture to stand for some hours, and filtering. Alkaline and slightly alkaline preparations of hypochlorites are described below. Unless strongly alkaline, solutions of hypochlorites decompose rapidly.

LIQUOR SODAE CHLORINATAE (LIQ. SOD. CHLORINAT.), SOLUTION OF CHLORINATED SODA, U. S. P. (Labarraque's Solution).—An aqueous solution of sodium hypochlorite and sodium chlorid containing at least 2.5 per cent. of available chlorin. It is made by decomposing a solution of chlorinated lime with sodium carbonate and removing the insoluble calcium carbonate formed.

Surgical Solution of Chlorinated Soda, N. N. R., of Carrel and Dakin contains 0.43 to 0.48 per cent. of available chlorine, free from caustic alkali. It may be prepared by decomposing chlorinated lime with specified amounts of sodium carbonate and sodium bicarbonate in the presence of water. After the precipitate formed has subsided, the supernatant solution is filtered off and adjusted to the required alkalinity and content of available chlorine.

ACTION AND USES: Solution of chlorinated soda, like chlorinated lime, is used chiefly as a disinfectant. Diluted with from 15 to 20 parts of water it may be employed as a spray, gargle or wash.

DOSAGE: 1 Cc. or 15 minims.

Camphora (Camph.), Camphor, U. S. P.—A ketone, obtained from *Cinnamomum camphora*. It is dextro-rotatory.

PROPERTIES: Camphor occurs as white, translucent masses of a tough consistence and having a characteristic odor and a pungent aromatic taste. It is readily pulverizable in the presence of a little alcohol, ether or chloroform. It is very slightly soluble in water, but freely soluble in alcohol, ether, chloroform and in fixed and volatile oils.

ACTION AND USES: Camphor stimulates the central nervous system, especially the medullary centers, and the circulation. In toxic doses it produces delirium followed by unconsciousness with epileptiform convulsions.

Camphor tends to increase the blood pressure. The effects on animals are complex and rather inconstant. Many clinicians believe that camphor improves the pulse in impending cardiac collapse, probably by cardiac stimulation; others believe it ineffective. It is used as a circulatory and respiratory stimulant in cases of collapse, syncope, cardiac failure, etc., by hypodermic administration of from 0.5 to 1 Cc. of a 10 to 20 per cent. sterile solution in olive or almond oil injected at short intervals for a few doses. Solutions in liquid petrolatum should not be used.

The antiseptic action of camphor is utilized in gargles and mouth washes. It is also given in dyspepsia as a carminative, and is used in the first stage of colds and other infections of the respiratory tract.

Locally camphor is mildly irritant, causing a loss of tone of the peripheral blood vessels, and thus producing redness of the skin. It is also a local analgesic. It is employed, for its mild rubefacient and counterirritant effects, as an ingredient of liniments. Powders containing camphor are antipruritic.

DOSAGE: 0.10 Gm. or about 1½ grains. When a prompt cardiac or central action is demanded, much larger doses may be required. For oral administration, it may be given in an oily or alcoholic solution or in pills, capsules or cachets.

AQUA CAMPHORAE (AQ. CAMPH.), CAMPHOR WATER, U. S. P.—A saturated solution of camphor in distilled water. It is a very weak preparation. Camphor water is often used as a vehicle for collyria.

DOSAGE: 10 Cc. or about 2½ fluidrams (containing 0.04 Gm. or ½ grain of camphor).

SPIRITUS CAMPHORAE (SP. CAMPH.), SPIRIT OF CAMPHOR, U. S. P.—One hundred Cc. contain 10 Gm. camphor in alcohol.

DOSAGE: 1 Cc. or 15 minims.

LINIMENTUM CAMPHORAE (LIN. CAMPH.), CAMPHOR LINIMENT, U. S. P. (Camphorated Oil).—One hundred Cc. contain 20 Gm. camphor in cottonseed oil. This preparation should not be used for hypodermic injection.

Cantharis (Canthar.), Cantharides, U. S. P. (Spanish Flies, Russian Flies).—The beetle *Cantharis vesiatoria,* yielding not less than 0.6 per cent. of cantharidin.

ACTION AND USES: Cantharides is very irritating to the intestinal canal, producing hyperemia of the mouth and throat and vomiting. It is readily absorbed from the intestinal canal and produces marked irritation of the kidneys, affecting, at first, the glomeruli and subsequently the urinary tubules. In its passage through the urinary channels, it irritates the mucous membranes of the bladder and urethra and produces a desire to urinate, sometimes amounting to strangury. Cantharides is also a local irritant to the skin and produces blisters. It may be absorbed from the skin in sufficient quantities to cause nephritis. The internal use of cantharides is dangerous.

The local irritant action of cantharides is the basis of its use for the treatment of baldness, for which it is used in the form of tincture greatly diluted with alcohol (from 1:15 to 1:30) or in ointments, but it is of little benefit in that condition. The chief use of cantharides is as a vesicant, for which purpose cantharides plasters (see below) are employed. It is contraindicated in nephritis; and when vesication is desired in nephritis, another agent such as ammonia or chloroform should be selected. Cantharides plasters may be used to produce rubefaction by applying them for a time insufficient to blister. When the irritation is carried just to the point of beginning vesication, the result is known as a flying blister. The counterirritation may be rendered continuous by a succession of such "flying" blisters.

CERATUM CANTHARIDIS (CERAT. CANTHAR.), CANTHARIDES CERATE, U. S. P. (Blistering Cerate).—Contains 35 per cent. of cantharides.

Ceratum cantharidis may be used for vesication, but the blistering plasters commonly put up by manufacturers have a slightly different base. A blister will usually be formed in the course of six hours. Vesication can sometimes be hastened by removing the cantharides plaster after a few hours and applying hot poultices. Cantharides cerate should not be applied directly over an inflamed part.

TINCTURA CANTHARIDIS (TR. CANTHAR.), TINCTURE OF CANTHARIDES, U. S. P. (Cantharidis Tinctura, P. I.).—One hundred Cc. represents 10 Gm. of cantharides in alcohol.

DOSAGE: 0.1 Cc. or 1½ minims.

Capsicum (Capsic.), Capsicum, U. S. P. (Cayenne Pepper, African Chillies).—The dried, ripe fruit of *Capsicum frutescens.*

ACTION AND USES: Capsicum is carminative, stimulant and rubefacient. It is sometimes used in atonic dyspepsia, especially in cases due to chronic alcoholism. Such use should be cautious and not long continued.

DOSAGE: 0.06 Gm. or about 1 grain. Externally it is frequently used in the form of liniment, generally a mixture of the tincture (25 per cent.) with the official soap liniment. The tincture mixed with an equal quantity of glycerin is used as a gargle in tonsillitis, pharyngitis, etc.

Capsicum plaster and ointment (25 per cent., in petrolatum) are suitable preparations for counterirritation in neuralgia, muscular rheumatism, etc.

TINCTURA CAPSICI (TR. CAPSIC.), TINCTURE OF CAPSICUM, U. S. P.—One hundred Cc. represent 10 Gm. of the drug in approximately 90 per cent. alcohol.

DOSAGE: 0.5 Cc. or 8 minims.

Carbo Ligni (Carbo Lig.), Wood Charcoal, U. S. P. (Charcoal).—Prepared from soft wood (either willow or maple) and very finely powdered.

PROPERTIES: Charcoal is a black, odorless and tasteless powder, free from gritty matter.

ACTION AND USES: Locally charcoal may be employed as a deodorant for fetid ulcers, etc., best applied as the dry product sewn into a bag.

Because of its well-known property of absorbing and condensing gases, charcoal has long been administered in cases of flatulence, the prescribers evidently losing sight of the fact that when thoroughly wet it loses its property of absorbing fermentative gases. It is used to indicate the length of time food remains in the alimentary tract. Charcoal administered with the test diet causes the feces formed from that diet to have a black color. It is also commonly used to distinguish the periods of diet in metabolism experiments.

DOSAGE: 1 Gm. or 15 grains. Preferably administered in cachets, not more than 0.5 Gm. or 8 grains in each.

Cardamomi Semen (Cardam. Sem.), Cardamom Seed, U. S. P. (Cardamomum, U. S. P. VIII).—The dried seeds of *Elettaria cardamomum.*

ACTION AND USES: Cardamom is used as an aromatic, carminative and stomachic.

TINCTURA CARDAMOMI (TR. CARDAM.), TINCTURE OF CARDAMOM.—Represents 20 per cent. of cardamom in diluted alcohol. This preparation should not be confounded with compound tincture of cardamom (Tinctura Cardamomi Compositae, U. S. P.), which is a comparatively weak solution of the soluble constituents of cardamom, cinnamon and caraway in diluted alcohol, colored red with cochineal; the latter may be used as an aromatic vehicle for medicaments that require dilute alcohol for solution.

DOSAGE: 5 Cc. or 1 fluidram.

Caryophyllus (Caryoph.), Clove, U. S. P. (Cloves).—The dried flower buds of *Eugenia aromatica.*

Oleum Caryophylli (Ol. Caryoph.), Oil of Clove, U. S. P. (Clove Oil, Oil of Cloves).—A volatile oil distilled from cloves, consisting largely (82 per cent.) of eugenol.

Properties: Oil of clove occurs as a colorless or pale yellow liquid, becoming darker and thicker by age and exposure. Oil of clove is freely soluble in alcohol, but nearly insoluble in water.

Action and Uses: Oil of clove is antiseptic and aromatic. It is frequently used as a carminative and externally as counterirritant. In dental practice it is used as an anodyne.

Dosage: 0.2 Cc. or 3 minims dissolved in alcohol, or taken on granulated sugar, or in some emulsion, on shaved ice or in capsules. To relieve toothache it should be dropped on a minute piece of cotton and inserted into the cavity of the carious tooth. For external use it is diluted with 2 or 3 parts of fatty oil.

Cascara Sagrada (Casc. Sagr.), Cascara Sagrada, U. S. P. (Rhamnus Purshiana, U. S. P. VIII).—The dried bark of the trunk and branches of *Rhamnus purshiana.*

Action and Uses: The preparations of cascara sagrada are laxative, acting mainly in the colon, and are widely used for habitual constipation. The dose can often be gradually reduced without constipation following.

Fluidextractum Cascarae Sagradae (Fldext. Cascar. Sagr.), Fluidextract of Cascara Sagrada, U. S. P. (Fluidextractum Rhamni Purshianae, U. S. P. VIII, Fluid Extract of Cascara Sagrada).—One hundred Cc. represent 100 Gm. of the drug in approximately 40 per cent. alcohol. The presence of a bitter principle renders this preparation useful as a stomachic as well as a laxative.

Dosage: 1 to 2 Cc. or 15 to 30 minims, 3 times daily; smaller doses should be used if efficient for laxative effect.

Fluidextractum Cascarae Sagradae Aromaticum (Fldext. Cascar. Sagr. Arom.), Aromatic Fluidextract of Cascara Sagrada, U. S. P. Fluidextractum Rhamni Purshianae Aromaticum, U. S. P. VIII, Aromatic Fluidextract of Cascara Sagrada).—One hundred Cc. represent 100 Gm. of the drug previously treated with magnesium oxid, to deprive it of its bitter principle, and aromatized and sweetened with extract of glycyrrhiza, benzosulphinid, oil of anise, oil of cassia, oil of coriander and methyl salicylate. This preparation is often preferred as a laxative on account of its pleasant taste, but is considerably less active than bitter fluid extract.

Dosages From 2 to 4 Cc. or from 30 to 60 minims. The smaller dose may be given several times a day, the larger once daily at bedtime.

Extractum Cascarae Sagradae (Ext. Casc. Sagr.), Extract of Cascara Sagrada, U. S. P. (Extractum Rhamni Purshianae, U. S. P. VIII, Powdered Extract of Cascara Sagrada).—A powdered extract representing three times its weight of the drug.

Dosage: From 0.1 to 0.5 Gm. or from 2 to 8 grains in pill or capsule form.

Cera Alba (Cer. Alb.), White Wax, U. S. P., is the bleached form of:

Cera Flava (Cer. Flav.), Yellow Wax, U. S. P.—A solid substance prepared from the honeycomb of the bee, *Apis mellifera.* In medicine wax is chiefly used to stiffen ointments, so that they will not run through a dressing (Cerates).

Chenopodium.—Now used in medicine only as:

Oleum Chenopodii (Ol. Chenopod.), Oil of Chenopodium, U. S. P.—A volatile oil distilled from *Chenopodium ambrosioides anthelminticum.* It should be kept in well-stoppered amber-colored bottles, in a cool place, protected from light.

Properties: Oil of chenopodium is a colorless or pale yellow liquid, with a pungent, irritating odor and a bitter taste. It is soluble (1: 8) in 70 per cent. alcohol.

Action and Uses: Oil of chenopodium is an effective anthelmintic against ascarides and hookworm; it is also used against intestinal amebas. The drug paralyzes but does not kill the worms, which must be eliminated by free purgation. Therapeutic doses often produce minor toxic symptoms, especially dizziness and nausea, sometimes vomiting, temporary deafness or general depression. The deafness is sometimes more persistent.

Severe intoxication is rare, and generally attributable to gross overdosage; but a few deaths are reported from therapeutic doses. The symptoms in severe cases pass into severe depression, and convulsions and coma. Fasting increases the toxicity of the drug. Subminimal doses, repeated at intervals of several days, become toxic, thus indicating cumulation. The drug is absorbed slowly from the stomach, but rapidly from the intestine. Oil of chenopodium is also a local irritant.

Dosage: The dosage against ascarides is 0.2 Cc. or 3 minims, dropped on sugar 2 or 3 times daily for two days, and followed by a tablespoonful of castor oil.

Against hookworm or amebas, the routine consists in a light evening meal, followed by a purgative dose of magnesium sulphate. In the morning, the patient receives some milk followed by 3 doses of chenopodium oil, each of 0.5 Cc. on a teaspoonful of granulated sugar an hour apart. Two hours after the last dose, magnesium sulphate is again given. The course is repeated every three to five days, until the parasites have disappeared from the feces.

The dosage for children is 1 drop, on sugar, for each year of the child's age. The treatment may be contraindicated during fever or acute gastro-intestinal inflammations. If toxic symptoms, particularly inordinate sleepiness or depression, manifest themselves, the drug should be withdrawn at once, active purgation induced and stimulation begun with strong hot coffee by mouth or rectum.

Chloralum Hydratum (Chloral. Hydrat.), Hydrated Chloral, U. S. P. ("Chloral," Chloral Hydrate).—A compound of trichloraldehyd or chloral, with the elements of one molecule of water. It contains not less than 99.5 per cent. of $CCl_3CH(OH)_2$.

PROPERTIES: Hydrated chloral occurs as colorless and transparent crystals, having an aromatic penetrating odor, and a bitterish, caustic taste. It is very soluble in water (1: 0.25) alcohol (1: 1.3) or ether.

INCOMPATIBILITIES: Hydrated chloral is incompatible with alkalies and alkali carbonates, which cause the formation of chloroform. From mixtures containing hydrated chloral, an alkali bromid and alcohol, a compound of chloral believed to be chloral alcoholate sometimes separates.

ACTION AND USES: Hydrated chloral acts on the central nervous system, small doses producing a feeling of weariness followed by quiet sleep in which the pulse and respiration are slowed in the same manner as in normal sleep and the reflexes are not abolished. From this sleep the person can readily be awakened. Larger doses produce more rapid and deeper unconsciousness and abolition of reflexes. There is slowing of the respiration and fall of blood pressure. The cutaneous vessels are dilated and a marked fall of temperature occurs. With fatal doses death results ordinarily from paralysis of the respiratory center but sometimes by paralysis of a weakened heart.

Hydrated chloral is a reliable hypnotic in insomnia due to nervous excitation. It is not so valuable when the sleeplessness is primarily due to a painful affection. In such cases morphin or codein is more effective. At times it may be combined with opium or morphin. It should not be used when there is degeneration of the heart muscle. In other cases of heart disease and in arteriosclerosis it may be given cautiously.

Hydrated chloral may be given in moderate doses as a nervous sedative, especially in conjunction with the bromids.

Hydrated chloral is valuable in tetanus, in which it must be used boldly to overcome the convulsions. In delirium in fever it may be administered in small doses. It should not be given, however, if the delirium can be controlled by other means, or if the circulation is feeble. It is useful as an antispasmodic in obstinate cases of hiccup.

DOSAGE: From 0.30 to 1.3 Gm. or from 5 to 25 grains, freely diluted with water or milk. The dose may be repeated in from one to three hours, according to its size, if needed, but the condition of the pulse and respiration should be carefully watched when large doses are given.

While hydrated chloral has the reputation of being especially dangerous, this refers to large doses. Smaller doses, 0.3 Gm. or 5 grains, are about as effective as the ordinary doses of other hypnotics and relatively safe. Habit formation is quite common, perhaps more so than with some other hypnotics.

Chloramin-T.—Sodium Paratoluenesulphochloramid, N. N. R. —$CH_3C_6H_4SO_2NaNCl+3H_2O$, 1 : 4

ACTION AND USES: The actions of chloramin-T are essentially similar to those of surgical solution of chlorinated soda. It has the advantages of greater stability and convenience of preparation, and produces less irritation. On the other hand, it lacks the solvent action of alkaline hypochlorites. It is practically nontoxic, but should not be taken by mouth, since it is decomposed by the gastric juice.

DOSAGE: Chloramin-T is employed in 0.1 to 4 per cent. aqueous solution. For wounds, the normal strength is from 1 to 2 per cent., applied by the same technic as the surgical solution of chlorinated soda. It has also been employed for irrigation of the urethra, bladder and uterus, and as a mouth wash. It is also used as a paste, containing 1 per cent. of chloramin-T in a base composed approximately of 15 per cent. of sodium stearate and 85 per cent. of water.

Chloroformum (Chlorof.), Chloroform, U. S. P.—A liquid consisting of from 99 to 99.4 per cent. of chloroform, $CHCl_3$, and from 0.6 to 1 per cent. of alcohol, C_2H_5OH, added as a preservative.

PROPERTIES: Chloroform occurs as a heavy, clear, colorless and mobile liquid, of a characteristic odor, and a burning sweet taste. It is but slightly soluble in water (1: 210), but is miscible, in all proportions, with alcohol, ether and the fixed and volatile oils.

Chloroform should be protected from the light by storing in a dark place or in dark well-stoppered bottles. It readily deteriorates under the influence of heat, light and air, and the decomposition products must be avoided in the use of this product in general anesthesia. For this reason the vapors should not be allowed to come in contact with a flame.

ACTION AND USES: The main use of chloroform is by inhalation, for the production of general anesthesia. The excitement stage resembles that of ether, but it is of shorter duration and therefore less unpleasant. It is much more dangerous, however, most acute fatalities occurring by stop-

page of the heart early in the administration. This danger is lessened by atropin.

The anesthetic stage is also more dangerous than with ether, there being a gradual but progressive fall of blood pressure, even if the administration is carefully managed. The fall is due to depression of both the cardiac muscle and vasomotor center. The respiratory center is also more depressed. If an excessive concentration is given, death occurs, in this stage usually by stoppage of respiration; but since the heart and vasomotor center are also greatly weakened, recovery is more difficult than with ether. Sometimes, especially in cardiac disease, the heart may be the first to fail.

The irritant actions on the kidneys and respiratory tract are probably about the same as with ether.

Prolonged administration is especially dangerous, often producing death after several days by so-called delayed chloroform poisoning. This is characterized by general fatty degeneration, especially marked in the liver, which may pass into a condition analogous to acute yellow atrophy.

Chloroform is distinctly less safe as an anesthetic than ether and should be employed only when ether is unavailable or its use inadmissible for some reason. Chloroform is held by many physicians as specially suitable for anesthesia in children and during childbirth.

Chloroform acts locally as a penetrating and fairly powerful irritant, which may blister if its evaporation is prevented. It is used in liniments. Taken by mouth, small doses are carminative, anodyne and antiseptic; it is therefore used in gastric fermentation and colic. Larger doses are sometimes employed as a vermifuge. Excessive doses produce unconsciousness and coma, similarly to the results of its inhalation. Analgesia for painful dressings and short operations may be produced by the self-inhalation of a fixed dose of 5 Cc. of chloroform. This appears to be entirely safe, but the dose should never be exceeded.

DOSAGE: Internally, from 0.05 to 0.3 Cc. or from 1 to 5 minims.

Chloroform may be prescribed in a variety of forms. The Pharmacopeia includes:

AQUA CHLOROFORMI (AQ. CHLOROF.), CHLOROFORM-WATER, U. S. P.—A saturated aqueous solution of chloroform containing approximately 1 part in 200.

DOSAGE: It may be made extemporaneously by adding a few drops of chloroform to a bottle of water, shaking well and allowing the excess to subside. A teaspoonful contains approximately 0.02 Cc. or ⅓ minim of chloroform. The average dose of chloroform water is 15 Cc. or 4 fluidrams.

SPIRITUS CHLOROFORMI (SP. CHLOROF.), SPIRIT OF CHLOROFORM, U. S. P.—One hundred Cc. contain 6 Cc. of chloroform in alcohol.

DOSAGE: 2 Cc. or 30 minims containing 0.12 Cc. or 2 minims of chloroform.

LINIMENTUM CHLOROFORMI (LIN. CHLOROF.), CHLOROFORM LINIMENT, U. S. P.—A 30 per cent. solution of chloroform in soap liniment. Painful muscles.

Chromii Trioxidum (Chrom. Triox.), Chromium Trioxid, U. S. P. (Chromic Acid, Chromic Anhydrid).—Contains not less than 95 per cent. of CrO_3.

PROPERTIES: Chromium trioxid occurs as small needle-shaped crystals or prisms of dark purplish-red color and metallic luster; it is odorless, destructive to animal and vegetable tissue, deliquescent in air and very soluble in water (1: 0.6).

INCOMPATIBILITIES: Because of its powerful oxidizing properties chromium trioxid should not be brought in contact with alcohol, glycerin or other oxidizable substances lest explosion result.

ACTION AND USES: In medicine chromium trioxid is used only as a caustic either in the solid form or in aqueous solution. In nasal hemorrhage from ulcer of septum Holt recommends touching the ulcer with chromium trioxid. Dilute solutions are used to check local sweating.

Chrysarobinum (Chrysarob.), Chrysarobin, U. S. P.—A mixture of neutral principles extracted from Goa powder, a substance found deposited in the wood of *Vouacapoua araroba.*

PROPERTIES: Chrysarobin is a pale orange-yellow to brownish, microcrystalline powder, tasteless, odorless and irritating to the mucous membrane. It is very slightly soluble in water, but rather more soluble in alcohol (1: 385), and soluble in chloroform (1: 12.5).

ACTION AND USES: Chrysarobin is antiparasitic and a powerful irritant to the skin. It is more active than tar and must be used with corresponding caution. It is especially indicated in chronic dermatoses in which the production of an acute inflammatory reaction is sometimes desired. It is also employed in the treatment of fungus diseases of the skin. Soriasis. ringworm

Chrysarobin is used externally in ointment or solution in the strength of from 2 to 10 or even 20 per cent. In the weaker proportions it is often quite as effective as in the stronger and does not excite acute dermatitis.

Chrysarobin stains the skin brownish, the hair greenish-yellow, the nails reddish-brown. Its use about the head should be avoided. It also stains clothing a walnut brown. This stain can be removed by dilute solution of caustic soda or solution of chlorinated soda.

UNGUENTUM CHRYSAROBINI (UNG. CHRYSAROBIN.), CHRYSAROBIN OINTMENT, U. S. P.—Representing a solution of about 5 per cent. of chrysarobin in benzoinated lard.

Cinchona (Cinch.), Cinchona, U. S. P.—Official as cinchona and cinchona rubra. The dried bark of several species, principally hybrids, of *Cinchona* yielding 5 per cent. of the alkaloids of cinchona, the chief of which is quinin.

ACTION AND USES: The preparations of cinchona are seldom used to obtain the systemic effects of quinin. They are mostly employed as bitter tonics. (See Quinin.)

TINCTURA CINCHONAE (TR. CINCH.), TINCTURE OF CINCHONA, U. S. P.—One hundred Cc. represent about 20 Gm. cinchona in a mixture of alcohol (63 per cent.), water and glycerin.

DOSAGE: 4 Cc. or 1 fluidram.

Cinchophen, Cinchophen. Acidum Phenylcinchoninicum (Acid. Phenylcinch.), Phenylcinchoninic Acid, U. S. P. (Phenyl-Quinolin-Carboxylic Acid.—An organic acid, 2-phenyl-quinolin-4 carboxylic acid, $C_6H_5.C_9H_5N.(COOH)$.

PROPERTIES: Cinchophen occurs in small, colorless crystals or as a white or yellowish-white powder, having not more than a slight odor resembling benzoic acid, and a bitter taste. It is permanent in air, insoluble in cold water and only slightly soluble in cold alcohol.

ACTION AND USES: Cinchophen increases the permeability of the kidneys selectively to uric acid, and therefore greatly increases the excretion of urates, and tends to lower their concentration in the blood. This action is similar to that of salicylates, but more prompt and powerful. It disappears within a few hours after the administration is discontinued. There are no important effects on other metabolites.

Cinchophen was originally introduced with the idea of removing accumulations of urates and tophi in gout. This expectation was not fulfilled; but cinchophen was found to be an exceptionally efficient analgesic in gout and acute and chronic arthritis. In acute, gouty attacks, it relieves more promptly than colchicum and without undesirable by-effects.

DOSAGE: 0.5 Gm. or 8 grains four times a day to 1 Gm., or 15 grains three times a day taken with large quantities of water.

Cinnamomum Saigonicum (Cinnam. Saigon.), Saigon Cinnamon, U. S. P.—The commercial drug is the dried bark or inner bark of an undetermined species of *Cinnamomum*.

ACTION AND USES: In medicine it is largely used as an aromatic or carminative.

Oleum Cassiae (Ol. Cass.), Oil of Cinnamon, U. S. P. Oleum Cinnamomi, U. S. P. VIII, Cassia Oil.—A volatile oil distilled from *Cinnammomum cassia,* yielding not less than 80 per cent. of cinnamic aldehyd. It occurs as a yellowish liquid having the characteristic odor of cinnamon and a sweetish, spicy and burning taste. It is freely soluble in alcohol but only very slightly soluble in water.

Dosage: 0.05 Cc. or 1 minim.

Aqua Cinnamomi (Aq. Cinnam.), Cinnamon Water, U. S. P.—A saturated solution of oil of cinnamon in distilled water; it is largely used as a vehicle.
Dosage: 15 Cc. or 4 fluidrams.

Cocaina (Cocain.), Cocain, U. S. P.—An alkaloid obtained from the leaves of *Erythroxylon coca.*

Properties: Cocain forms large, colorless prisms, having a slightly bitter taste and producing on the tongue a temporary numbness. It is only slightly soluble in water (1: 600), soluble in alcohol (1: 6.5), and also soluble in fixed oils, but insoluble in petrolatum and lard. The hydrochlorid is freely soluble in water; hence cocain is generally employed in this form.

Incompatibilities: Solutions of cocain or of any of its salts after being kept a long time, or on boiling, are partly hydrolyzed into ecgonin, benzoic acid and methyl alcohol. Solutions of cocain cannot be sterilized by boiling without some loss, but the amount of decomposition is ordinarily so small as to be insignificant.

Cocainae Hydrochloridum (Cocain. Hydrochl.), Cocain Hydrochlorid, U. S. P. (Cocain Chlorid, Cocainum Hydrochloricum, P. I.).—The neutral hydrochlorid of the alkaloid cocain.

Properties: Cocain hydrochlorid occurs in colorless prisms, flaky, lustrous leaflets or a white, crystalline powder. It is very soluble in water (1: 0.4) and freely soluble in alcohol (1: 3.2).

Incompatibilities: It is incompatible with alkalies and sodium borate.

Action and Uses: The most important action of cocain is functional paralysis of nerve fibers, on direct application, resulting in local anesthesia. It also causes local vasoconstriction. When absorbed, it is toxic by stimulation and paralysis of various parts of the central nervous system, in irregular sequence.

Local Anesthesia.—Cocain is the oldest representative of the group of local anesthetics. Numerous synthetic drugs, however, have nearly identical actions, and have advantages, especially in certain fields. They may be discussed together. They all have a selective depressant action on nerve fibers, especially on sensory nerves, resulting in temporary suppression of the function with complete recovery when the drug is removed. The local

anesthetics, therefore, lose their activity when they are absorbed into the general circulation. When absorbed, they are more or less toxic. It is, therefore, desirable to use the smallest quantity of the anesthetic, and to confine it as closely as possible to the place of operation, as well as to prevent systemic absorption. These objects are attained by proper technic, and by the proper choice of the drugs for each field of use.

When local anesthetics are applied to mucous membranes (surface anesthesia), it is essential that they penetrate through the epithelium. In this respect, procain and its relatives are notably inferior to cocain and most of the other synthetic anesthetics. Absence of harmful irritation is also indispensable. For conjunctival application cocain (usually 1 to 4 per cent.) is still preferred. Phenacain (holocain) 1 per cent., is equally efficient, but produces considerable smarting. Cocain dilates the pupil.

Cocain is a mydriatic, acting both locally and centrally, by stimulation of the sympathetic. The dilatation is not so complete as that produced by atropin and reaction to light is not abolished. For use in the urethra, low toxicity is important, since this is a good absorbing surface. None of the effective anesthetics are entirely safe; but the danger can be minimized by using dilute solutions. Cocain is effective, and there is little danger if used in the dilution of 0.1 to 0.2 per cent for the bladder, or 0.5 per cent. for urethra. The efficacy is probably increased if the dilution is made just prior to use with 0.5 per cent. sodium bicarbonate. A trace of epinephrin may be added (3 drops of 1:1,000 solution per injection) to diminish absorption or bleeding. Cocain itself produces some vasoconstriction, but the synthetic anesthetics do not constrict.

For throat and nose operations, the difficulty of procuring prolonged contact has led to the use of strong solutions of cocain, 10 to 20 per cent., or a trace of the powdered drug on the point of a probe. Epinephrin is usually added (1:50,000). The strong solutions or powder must be used only on small areas, procain being used for extensive operations. For deeper operations, the local anesthetic is injected, first into the skin proper; then in the neighborhood of the sensory nerves that supply the area, so as to anesthetize their distribution (conduction anesthesia). For this purpose, procain is equal to cocain in efficacy, and is very much less likely to lead to poisoning. It is used in dilutions of ½ of 1 per cent. to 2 per cent., preferably made with 1 per cent. of potassium chlorid, with the addition of 1 mg. of epinephrin per gram of procain. For spinal anesthesia, tropacocain has largely been used (½ to 1 Cc. of 5 per cent.); procain probably answers equally well. Potassium chlorid, 1 per cent., can be used as diluent.

Toxic Effects.—These are likely to occur if the drugs are rapidly absorbed, whereas slow absorption is relatively harmless. The safety depends on the prompt destruction of these substances in the body. The destruction of

cocain is relatively slow, and this accounts for the more frequent accidents. The toxic symptoms are similar for all the local anesthetics. They begin with excitement, vertigo, pallor, palpitation, vomiting and fainting, and progress rapidly to collapse, sometimes with brief convulsions. Death may occur in a few minutes. The treatment is by artificial respiration and the injection of epinephrin.

Cocain Habit: Coain was formerly used for its stimulant properties, as it produces in susceptible individuals a condition of psychic excitement. Such a use, however, easily leads to habituation. Cocain habit is especially difficult to treat, because sudden withdrawal is followed by distressing and even dangerous symptoms; whereas continuance of its use results in chronic poisoning, especially characterized by psychic deterioration. The Harrison Narcotic Law[1] is of assistance in lessening the danger of cocain habituation as it makes refilling of prescriptions for cocain impossible.

DOSAGE: The internal dose is stated as 0.015 Gm., or ¼ grain, but the drug is rarely used other than locally. The dosage for local application is given above. Cocain solutions do not keep well, although they may be sterilized by brief boiling. The substitutes form stable solutions.

Codeina (Codein.), Codein, U. S. P.—An alkaloid obtained from opium or prepared from morphin by methylation.

PROPERTIES: Codein occurs as colorless translucent crystals or a crystalline powder, odorless and having a faintly bitter taste. Codein is slightly soluble in water (1: 120), and freely soluble in alcohol (1: 2).

ACTION AND USES: Codein is analgesic, hypnotic and sedative. Its effects resemble morphin, except that it is very much less likely to produce habit. It should, therefore, be preferred wherever feasible; especially in cough, where adequate doses are equally effective. Its analgesic and hypnotic effects are more feeble. It is preferred by some authors in diabetes.

Prescriptions for codein must conform to the provisions of the Harrison Narcotic Law.[1]

DOSAGE: 0.03 Gm. or ½ grain.

1. The Harrison Narcotic Law requires that the prescriber shall state on the prescription the patient's name and address, as well as his own name and address and the number of his registration license. The latter is obtained from the U. S. Department of Internal Revenue on payment of an annual registration fee. If the patient is suffering from an incurable disease or is an aged or infirm addict, these facts, together with the patient's age, must be given on the prescription, together with a statement by the physician that the drug is necessary to sustain life. The following drugs whose use is restricted by the Harrison Law are dealt with in this volume: Cocain, codein, morphin and opium.

Codeinae Phosphas (Codein. Phos.), Codein Phosphate, U. S. P.—The phosphate of the alkaloid codein.

PROPERTIES: Codein phosphate occurs in white, needle-shaped crystals, or as a crystalline powder. It is freely soluble in water (1: 2.3) and only slightly soluble in alcohol (1: 325). It is preferred for hypodermic use.

DOSAGE: 0.03 Gm. or ½ grain.

Codeinae Sulphas (Codein. Sulph.), Codein Sulphate, U. S. P.—The sulphate of the alkaloid codein.

PROPERTIES: Codein sulphate occurs in needle-shaped crystals, or as a crystalline powder. It is soluble in water (1: 30), and very slightly soluble in alcohol (1: 1,280).

DOSAGE: 0.03 Gm. or ½ grain. It may be prescribed in a cough mixture such as the following:

℞ Codeinae sulphatis ..... 0.45 Gm.
Ammonii chloridi ..... 6.0 Gm.
Syrupi pruni virginianae.....ad 120.0 Cc.
M. Sig.: A teaspoonful every four hours.

Colchici Semen (Colch. Sem.), Colchicum Seed, U. S. P. (Colchici Semen, P. I.).—The seed of *Colchicum autumnale,* yielding not less than 0.45 per cent. of colchicin.

ACTION AND USES: Colchicum produces marked irritation of the intestines, leading to looseness of the bowels with much pain and watery stools. It may result in severe enteritis and collapse. The collapse is believed to be due to the intestinal irritation and not to a central action. It also produces irritation of the kidney, which may lead to severe nephritis. Colchicum seed is said to be antineuralgic and analgesic. By many it is considered to be a specific in acute gout, controlling the pain and cutting short the attack. It may be given to prevent the occurrence of gouty attacks, and it is recommended by some to continue it in smaller doses after the attack. It often fails, and there is wide divergence of opinion as to its usefulness.

TINCTURA COLCHICI SEMINIS (TR. COLCH. SEM.), TINCTURE OF COLCHICUM SEED, U. S. P. (Colchici Tinctura, P. I.).—One hundred Cc. represent 10 Gm. colchicum seed in approximately 55 per cent. alcohol; it should contain about 0.04 per cent. of colchicin. It is similar to but not identical with the international standard tincture of colchicum seed.

Colchicin Salicylate – Dose 1/300, Tab. for gout.

DOSAGE: 2 Cc. or 30 minims.

In acute gout the dose is from 10 to 30 minims of the tincture once every four hours until some decided evidence of its action, such as nausea or slight purging, is induced. Severe purging should be avoided. Colchicum is of little value in rheumatism.

Collodium (Collod.), Collodion, U. S. P.—A solution containing, in 100 Cc., 4 Gm. of pyroxylin, or guncotton, in a mixture of 3 volumes of ether and 1 volume of alcohol. It is used as a protective and a vehicle chiefly in the form of:

COLLODIUM FLEXILE (COLLOD. FLEX.), FLEXIBLE COLLODION, U. S. P.—A mixture of collodion with camphor (2 per cent.), and castor oil (3 per cent.). The addition of the small proportion of castor oil makes the resulting film elastic and more tenacious.

Colocynthis (Colocyn.), Colocynth, U. S. P. (Colocynth Pulp, Bitter Apple, Colocynth Apple).—The dried pulp of the fruit of *Citrullus colocynthis,* without admixture of more than 5 per cent. of seeds or more than 2 per cent. of epicarp. Colocynth belongs to the class of one-time popular hydragogue cathartics whose use appears to be on the decline. It is used in making:

EXTRACTUM COLOCYNTHIDIS (EXT. COLOCYNTH.), EXTRACT OF COLOCYNTH, U. S. P. (Powdered Extract of Colocynth).—Represents four times its weight of colocynth pulp.

DOSAGE: 0.03 Gm. or ½ grain.

Creosotum (Creosot.), Creosote, U. S. P. (Creasote).—A mixture of phenols and phenol derivatives, chiefly guaiacol and creosol, obtained during the distillation of wood-tar.

PROPERTIES: It occurs as a colorless or slightly yellowish, highly refractive, oily liquid, having a penetrating smoky odor and a burning, caustic taste. Creosote is slightly, but not completely soluble in water, and miscible in all proportions with alcohol, ether or fixed or volatile oils. Owing to its disagreeable odor and taste, it is seldom administered in the form of solution or mixture.

ACTION AND USES: Creosote acts similarly to phenol. It is antiseptic and is one of the few drugs which appear to have a just claim to be useful as gastro-intestinal antiseptics. It is used to some extent locally, in dilute form, for its antiseptic and anesthetic action. A droplet applied to the cavity of a carious tooth will usually relieve toothache temporarily. It has been given as a stimulant expectorant in chronic bronchitis and in tuberculosis. In the latter disease it has been credited with almost specific value. Experiments, however, show that it does not affect the viability of the tubercle bacilli in the lungs. Its favorable action in tuberculosis is due to gastro-intestinal antisepsis, its expectorant action and its antipyretic power. Less reliance is placed on it than formerly.

DOSAGE: 0.25 Cc. or 4 minims three times daily. It is preferably administered massed with glycyrrhiza or otherwise diluted, in the form of pills or capsules. If it impairs the appetite and disturbs digestion its use should be abandoned.

Cresol, Cresol, U. S. P.—A mixture of isomeric cresols, $C_6H_4.CH_3.OH$, obtained from coal tar, freed from phenol, hydrocarbons and water.

PROPERTIES: Cresol occurs as a colorless or yellowish to brown-yellow refractive liquid, having a phenol-like odor and becoming darker on exposure to light and air. It is soluble in water (1: 50) and miscible in all proportions with alcohol, petroleum benzin, ether and glycerin; it is miscible with soap solutions and with solutions of alkali hydroxids, yielding an economical form of disinfectant.

ACTIONS AND USES: Cresol is an active poison resembling phenol in its effects. Its germicidal power is approximately four times as great as that of phenol.

DOSAGE: 0.05 Cc. or 1 minim. As a disinfectant it may be used in solutions varying in strength from ¼ to 1 per cent. It is usually employed in the form of:

LIQUOR CRESOLIS COMPOSITUS (LIQ. CRESOL. CO.), COMPOUND SOLUTION OF CRESOL, U. S. P.—A mixture of equal parts of cresol and a solution of soap.

ACTION AND USES: Compound solution of cresol has about twice the germicidal power of pure phenol. On account of its saponaceous character it is much used for the disinfection of the skin, for lubricating the hands, and for vaginal douches in the form of aqueous solutions containing from 1 to 5 per cent.

Cupri Sulphas (Cupr. Sulph.), Copper Sulphate, U. S. P. (Cupric Sulphate).—Contains not less than 98.5 per cent. of $CuSO_4+5H_2O$.

PROPERTIES: Copper sulphate forms large, transparent, deep-blue crystals, odorless, having a nauseous, metallic taste. Copper sulphate is freely soluble in water (1: 2.5), but only slightly soluble in alcohol (1: 500).

INCOMPATIBILITIES: Copper sulphate is incompatible with soluble salts of lead, which precipitate the insoluble sulphate of lead; with fixed alkalies and alkaline carbonates, which precipitate copper hydroxid or copper carbonate; with iodids, which form insoluble cuprous iodid with liberation of iodin, and with vegetable astringents containing tannin.

ACTION AND USES: Copper sulphate is astringent in small doses and irritant in large doses, producing nausea and vomiting. Even minute amounts exert a germicidal action in water containing algae, fungi or bacteria of the colon group; but when organic matter is abundantly present the germicidal action is greatly weakened. Externally copper sulphate acts as an astringent, stimulant or mild caustic according to the strength of the application.

Copper sulphate is employed as a mild caustic in trachoma. It was formerly much used as an astringent in conjunctivitis. It is sometimes administered as an emetic but is not to be recommended except in phosphorus poisoning, in which it acts by rendering the phosphorus insoluble. It is occasionally prescribed for chronic diarrhea.

DOSAGE: As an astringent in diarrhea, 0.01 Gm. or 1/6 grain; as an emetic, 0.25 Gm. or 4 grains, not to be repeated.

As a caustic it is applied as the solid crystal or in pencils made by fusing 1 part of potassium alum and 2 parts of copper sulphate. When applications are made to trachomatous lids the affected parts of the everted lids should be touched lightly with the copper stick and the eye washed out afterward with lukewarm water. Collyria containing from 1 part in 1,000 to 1 in 100 may be used.

Dichloramin-T. — Paratoluenesulphondichloramid, N. N. R. —$CH_3C_6H_4.SO_2NCl_2$.—The dichloramid of paratoluenesulphonic acid, $CH_3.C_6H_4.SO_2OH$.

ACTION AND USES: Dichloramin-T is an effective germicide through its content of active chlorin. It is sparingly soluble in water by which it is easily decomposed; it is soluble in chlorcosane (chlorinated paraffin oil). The dichloramin-T-chlorcosane solutions produce a gradual, sustained antiseptic action. Dichloramin-T is more irritant than chloramin-T, but also more solvent. It should not be administered internally. Dichloramin-T is claimed to be useful in the prevention and treatment of diseases of the nose and throat; it has been used with success as an application to wounds.

DOSAGE: Dichloramin-T dissolved in chlorcosane, is used in concentrations of from 2 to 10 per cent. When used as a spray, a 2 per cent. solution of dichloramin-T is employed; for application to infected wounds a 3 to 10 per cent. solution of dichloramin-T. (The solution of dichloramin-T is stable for a short time only.)

DIGITALIS SUBSTANCES.—This group includes as its most important members digitalis and strophanthus. Others of the group are of minor importance. These drugs increase the tone of the heart and stimulate the vagus mechanism. In this way they slow and regulate the heartbeat, increase the cardiac output, and thus improve the circulation without affecting the blood pressure directly. They are employed to secure compensation in cardiac insufficiency, and are useful whenever the systole of the heart is insufficient on account of incomplete exertion of its muscular power. They cause the heart to empty itself more completely and prevent it from dilating excessively in diastole. They are especially valuable in auricular fibrillation, by partially blocking the auriculoventricular conduction. They relieve the ventricle of following many of the superfluous auricular contractions and permit the ventricle to contract at a slower rate and with more regular rhythm. This greatly improves the cardiac output, which in turn relieves the congestion, dyspnea, dropsy and other distressing symptoms, and increases the flow of urine. On the other hand, they are contraindicated in partial heart block. Overdoses produce nausea, vomiting, diarrhea, headache, cardiac irregularities and heart-

block. The emetic action of ordinary doses is not due to local irritation of the gastro-intestinal tract, as formerly supposed, but to the action on the heart itself; hence it cannot be avoided by rectal or intravenous administrations, or by the use of special preparations or isolated principles. When administered by mouth their absorption is slow and somewhat uncertain and their effects are correspondingly delayed and cumulative, so that they must be carefully watched.

Digitalis (Digit.), Digitalis, U. S. P. (Foxglove, Digitalis Folium, P. I.).—The dried leaves of *Digitalis purpurea.* When extracted and assayed biologically the minimum lethal dose should be approximately the equivalent of 0.6 mg. of digitalis for each gram of body weight of the frog. Digitalis contains a number of glucosidal principles, the most important of which are digitoxin, digitalin and digitalein, the actions of which are essentially similar. A number of preparations of these glucosids are on the market, but many are of uncertain composition, and since they have not yet demonstrated any superiority over good preparations of the whole drug, the latter are to be preferred. Digitalis is a fairly stable drug, and those preparations that are made with high percentages of alcohol retain their full activity with little alteration for several years. Aqueous solutions deteriorate more rapidly.

Action and Uses: Digitalis, either in substance or as one of the preparations referred to hereafter, is a cardiac tonic and indirectly diuretic. (See the preceding.)

Digitalis is useful whenever the systole of the heart is insufficient on account of incomplete exertion of its muscular power. It causes the heart to empty itself more completely and prevents it from dilating excessively during diastole. It is useful in myocardial insufficiency and symptoms arising therefrom, such as edema and dropsy, and in auricular fibrillation.

Dosage: 0.06 Gm. or 1 grain, in powder or pill three times daily after meals. Digitalis is a drug of variable strength, and hence a physiologically standardized preparation should be used. No perceptible effect is generally to be expected in less than twenty-four hours after oral administration. The effect can be hastened by the intensive use of larger doses; but this requires very close supervision.

Amelioration of symptoms and, in auricular fibrillation, a slowing of the pulse indicates the beginning of its physiologic action; nausea and vomiting coming on during the administration of the drug are usually due to a commencing toxic action. If the vomiting is due to other causes, the administration of the digitalis may be continued best by a different channel, such as the rectum or the veins,

or by hypodermic injection. For hypodermic and intravenous injections special preparations must be used, for which New and Nonofficial Remedies should be consulted.

OVERDOSAGE: As an overdose of digitalis or cumulative effects are most readily detected by a study of the pulse and heart action, a patient who is given digitalis should be kept under close observation.

Symptoms of digitalis poisoning are shown by nausea and vomiting, sometimes with abdominal pain and diarrhea, a very slow pulse, or heart block followed by a rapid and feeble one, and marked prostration. The heart may become irregular and sudden changes in position may result in great aggravation of the condition and sometimes in sudden death on slight exertion. On the occurrence of any of these symptoms, the administration should be suspended. As a rule, the conditions which require active doses of digitalis also require absolute rest in bed.

Aside from its use in powder or pills, digitalis is used largely as:

INFUSUM DIGITALIS (INF. DIGIT.), INFUSION OF DIGITALS, U. S. P.—One hundred Cc. represents the water-soluble constituents of 1.5 Gm. digitalis in a mixture of water and cinnamon water. It should be freshly prepared.

DOSAGE: 4 Cc. or 1 fluidram.

TINCTURA DIGITALIS (TR. DIGIT.), TINCTURE OF DIGITALIS, U. S. P. (Digitalis Tinctura, P. I.).—One hundred Cc. represent 10 Gm. digitalis in about 70 per cent. alcohol. Assayed biologically the minimum lethal dose should not be greater than 0.006 Cc. for each gram of body weight of the frog.

DOSAGE: 0.5 Cc. or 8 minims.

Elaterinum (Elaterin.), Elaterin, U. S. P.—A neutral principle obtained from elaterium, a substance deposited by the juice of the fruit of *Ecballium elaterium*.

PROPERTIES: Elaterin occurs as minute, white hexagonal scales or prismatic crystals, without odor and having a slightly acrid, bitter taste. It is practically insoluble in water and only slightly soluble in alcohol (1: 325).

The commercial substance is probably a mixture of principles. According to clinical observations, many lots of the drug have proved practically inert. Elaterin should not be confounded with elaterium.

ACTION AND USES: Elaterin is a powerful hydragogue cathartic, causing profuse watery evacuations with comparatively little pain.

It is used in dropsy, convulsions, puerperal eclampsia, etc. If used too freely or in debilitated persons it may produce dangerous weakness.

DOSAGE: 0.003 Gm. or 1/20 grain.

It is generally prescribed in the form of:

Trituratio Elaterini (Trit. Elaterin.), Trituration of Elaterin, U. S. P., which is 10 per cent. in strength.

Dosage: 0.03 Gm., or ½ grain.

Emetinae Hydrochloridum (Emet. Hydrochl.), Emetin Hydrochlorid, U. S. P.—The hydrochlorid ($C_{30}H_{44}N_2O_4.2HCl$ with not more than 19 per cent. water) of the alkaloid emetin obtained from ipecac.

Properties: Emetin hydrochlorid occurs as a white or very slightly yellowish crystalline powder, freely soluble in water or alcohol.

Action and Uses: Emetin acts similarly to ipecac, but is relatively more nauseant and less emetic; it causes relatively less renal irritation, but more cardiac depression. Emetin hydrochlorid has been found valuable in amebic dysentery and possibly other diseases due to pathogenic amebas.

Dosage: In amebic dysentery, 0.03 Gm. (½ grain) generally given subcutaneously or intramuscularly. Expectorant, from 0.005 to 0.01 Gm. (1/12 to ⅙ grain). From 0.01 to 0.02 Gm. (⅙ to ⅓ grain), given by mouth, causes emesis. The hypodermic administration often fails to reach the encysted amebas, which are found in the intestines, especially in chronic cases in the carriers. It then becomes advisable to resort to the oral administration, using either salol-coated pills of ipecac, or the Emetin-Bismuth Iodid (N. N. R.), which is only slightly soluble in the stomach, but which dissolves freely in the intestines. The usual dosage of this is 0.2 Gm. (3 grains) daily for four days. It may be prescribed in capsules.

Epinephrina (Epinephrin.), Epinephrin, N. N. R. (Adrenalin).—The blood pressure raising principle of the suprarenal gland, also produced synthetically (1-suprarenin), is official in the British, French, Italian and Belgian Pharmacopeias as adrenalin and in the German Pharmacopeia and the supplement of the Netherlands Pharmacopeia as suprarenin.

Properties: Chemically epinephrin is described as 1, 2-dihydroxy-4²-methylamino-ethyl-4¹-ol benzene, $C_6H_3(OH)_2(CHOH.CH_2NHCH_3)$, a substance with feeble basic properties, occurring in the suprarenal gland of the sheep or other animal. As commercially obtained it is a finely crystalline white or yellowish powder, odorless and slightly bitter. The free base is practically insoluble in water and is usually dispensed in the form of an aqueous solution, 1: 1,000, of one of its salts, generally the hydrochlorid. Epinephrin is oxidized readily and is thus destroyed in dilute alkaline solution.

Action and Uses: Epinephrin excites the sympathetic nerves so as to produce a variety of effects according to the function of the part supplied by the nerve. It causes a sudden rise of blood pressure by contraction of the arterioles. The pulse is slowed as the result of the increased blood pressure. The heart is stimulated directly, but the resistance offered by the contraction of the blood

vessels is such that at times the heart is unable to overcome it and suffers passive dilatation. The rise of blood-pressure which results from the action of this drug is very prompt but transient, lasting, as a rule, not more than five minutes.

Epinephrin dilates the pupil. It inhibits the peristaltic movements of the intestine and increases the secretion of saliva and other glands which receive a nerve supply from the sympathetic. It relaxes bronchial spasm. Epinephrin may produce hyperglycemia and glycosuria, and experiments on rabbits indicate that its continued use may cause a degeneration of the internal coats of the arteries. When given by the mouth it produces no evident effect on the general circulation, but it is readily absorbed into the mucous membranes of the nose, mouth, urethra, vagina and rectum, producing local contraction of the blood vessels. Very large doses (1 to 4 mg.), are tolerated when given hypodermically on account of the slow absorption due to the constriction of the blood vessels of the part in which it is injected. Such injection may cause necrosis of the skin, owing to impairment of nutrition from vascular spasm, especially if part of the dose is given intracutaneously.

Hypersensitiveness occurs in certain "nervous" individuals. In such persons the intramuscular injection of 0.5 mg. is followed by tremors, palpitation, apprehensive sensations, heightened blood pressure and increased heart rate.

Epinephrin acts promptly after intravenous injection, but is rapidly destroyed. Intravenous injection is dangerous, unless the dose is very minute, or a larger dose is given in great dilution and very slowly. Intramuscular injection is intermediate in effect between subcutaneous and intravenous injections.

The chief therapeutic use of epinephrin is to constrict the peripheral blood vessels by local application. A period of secondary dilatation follows. In this way it may be used to diminish hyperemia of the conjunctiva, to reduce swelling of the turbinated bodies, to arrest hemorrhage from the mucosa of the upper respiratory tract, and in operations on the eye, nose, ear, etc. It is successful only in capillary or small arterial bleeding, as it cannot stop a large vessel hemorrhage.

For the arrest of hemorrhage it must be applied directly to the bleeding vessels or congested area. If the blood washes it away the application may fail because it has not time to act. It may be swallowed to check hemorrhage from the stomach, but the chances of success are small because a quantity of liquid is usually present in the stomach which dilutes the remedy so that it is useless. It should not be given for internal, concealed hemorrhage, in which raising the blood pressure is not desirable.

Epinephrin is employed in conjunction with local anesthetics, especially cocain, to limit the absorption of the anesthetic and secure a more efficient local action. It has

proved very useful in relieving paroxysms of asthma by applying a spray to the nose or throat, and especially by hypodermic injection; it is also useful in anaphylactic shock and in relieving the urticaria of serum sickness.

Intravenous injections of epinephrin are sometimes useful to stimulate the heart action and raise the blood-pressure, in various forms of collapse. Its efficacy, however, is limited by the brief action, and there is considerable danger of producing cardiac dilatation and sudden death.

Dosage: Epinephrin or its hydrochlorid is employed in solutions of a strength of from 1:10,000 to 1:1,000. For internal or hypodermic administration the dose of a 1:1,000 solution is 1 Cc. or 15 drops; for intramuscular injection, 0.5 Cc. or 7 drops; for intravenous injection, 0.1 Cc. diluted freely with salt solution, injected very slowly. When an oily vehicle is to be used the base itself is prescribed, but when aqueous solutions are wanted one of the salts should be employed.

Ergota (Ergot.), Ergot, U. S. P. (Secale Cornutum, P. I., Ergot of Rye, Spurred Rye).—The dried sclerotium of *Claviceps purpurea,* replacing the grain of rye. Ergot owes its activity chiefly to ergotoxin (hydroergotinin), paraoxyphenylethylamin (tyramin), histamin (imidazolylethylamin) and probably other amins of minor importance. Paraoxyphenylethylamin is closely related to epinephrin both in composition and in pharmacologic action.

Action and Uses: The several active principles of ergot have somewhat different actions, but the total effect is as follows:

Ergot causes powerful tonic, sometimes tetanic contractions of the uterus. It tends to slow the pulse by stimulating the cardio-inhibitory centers. It also produces contraction of other involuntary muscles such as those of the blood vessels, stomach and intestines, the bladder, etc. Extreme and long-continued contraction of the blood-vessels, especially of the extremities, may lead to gangrene.

The only important use of ergot is to prevent post-partum hemorrhage. For this purpose a full dose is often given as soon as the second stage of labor terminates, but it is much safer to give it after the placenta has been expelled. Its use during labor should be avoided, as it may cause rupture of the uterus or asphyxia of the child. It is considered an effective prophylactic for "after-pains." Ergot is also used for hemorrhage from the uterus in menorrhagia and metrorrhagia. Its use for hemorrhage from other internal organs is not rational, as it increases blood pressure and tends to prolong rather than check the bleeding.

Ergot has also been employed against a number of other conditions, in which its use appears irrational; such as for congestions in various regions, for the treatment of the

early stage of acute pneumonia, for pulmonary congestion in typhoid fever, in diabetes insipidus, in colliquative night-sweats due to relaxation of the blood vessels, and as a circulatory stimulant.

DOSAGE: 2 Gm. or 30 grains. It is sometimes administered in the form of powder, but most commonly in the form of fluidextract.

FLUIDEXTRACTUM ERGOTAE (FLDEXT. ERGOT.), FLUIDEXTRACT OF ERGOT, U. S. P. (Secali Cornuti Extractum Fluidum, P. I.).—A hydro-alcoholic extract of ergot similar to, but not identical with, the international standard fluidextract of ergot.

DOSAGE: 2 Cc. or 30 minims.

Eucalyptus (Eucalypt.), Eucalyptus, U. S. P. (Blue Gum Leaves).—The dried leaves of *Eucalyptus globulus* collected from the older parts of the tree. Used in medicine in the form of:

EUCALYPTOL, EUCALYPTOL, U. S. P. (Cineol).—An organic compound, obtained from the volatile oil of *Eucalyptus globulus* and from other sources.

PROPERTIES: Eucalyptol occurs as a colorless liquid, having a distinctly camphoraceous odor, and a pungent, spicy and cooling taste. Eucalyptol is soluble in all proportions in alcohol, but is only slightly soluble in water.

DOSAGE: 0.3 Cc. or 5 minims.

OLEUM EUCALYPTI (OL. EUCALYPT.), OIL OF EUCALYPTUS, U. S. P. (Eucalyptus Oil).—The oil distilled from the fresh leaves of eucalyptus, and yielding not less than 70 per cent. of eucalyptol (cineol).

PROPERTIES: Oil of eucalyptus occurs as a colorless or pale yellow liquid, having a somewhat camphoraceous odor, and a pungent, spicy and cooling taste. It is miscible in all proportions with alcohol, but practically insoluble in water.

ACTION AND USES: Eucalyptol and oil of eucalyptus are antiseptic and expectorant. For internal use they are preferably administered in the form of capsules. For local application in the throat or nose they are used either in the form of oil sprays or are directed to be inhaled in the form of vapor from boiling water. Oil of eucalyptus, 2 Cc.; chloroform, 3 Cc. and castor oil, 40 Cc., mixed and taken in two portions at half-hour intervals, is sometimes used as an anthelmintic for uncinariasis.

DOSAGE: 0.5 Cc. or 8 minims.

Fel Bovis, Oxgall, U. S. P.—The fresh bile of the ox, *Bos taurus*. Used principally in the form of:

Extractum Fellis Bovis (Ext. Fel. Bov.), Extract of Oxgall, U. S. P. (Powdered Extract of Oxgall).—A light yellow powder having a peculiar odor and a bitter taste. Represents eight times its weight of oxgall.

Action and Uses: Extract of oxgall is an intestinal antiseptic, cholagogue and laxative. The bile salts are held to be the most powerful stimulants to the secretion of bile.

Dosage: 0.1 Gm. or 1½ grains. It is best administered in the form of pills or in gelatin capsules which have been treated with a solution of formaldehyd.

Ferri Carbonas, Ferrous Carbonate.

Properties: Ferrous carbonate is made by precipitating a solution of a soluble ferrous salt by a soluble carbonate. Such a precipitate tends to give off carbon dioxid, absorb oxygen and change rapidly into a basic carbonate, and finally into ferric hydroxid. Various pharmaceutical processes have been devised to prevent this change. The principle of these processes is well illustrated in the preparations described below as Vallet's mass (massa ferri carbonatis) and Blaud's pills (pilulae ferri carbonatis).

Action and Uses: The action of all forms of iron is essentially the same so far as the action of the iron component is concerned. When an iron salt is taken into the stomach it may be converted into a chlorid, but this is further changed during the process of digestion. The original form in which the iron was combined seems to make little or no difference in regard to the extent or the form in which it is absorbed. A large part of the iron ingested passes through the intestines without being absorbed. A smaller portion is absorbed, mainly through the lymph, and is deposited for a time in the blood-making organs, chiefly the spleen, where it is retained for an indefinite time as "reserve iron." Some of this supply is used in forming hemoglobin, which enters into the red blood corpuscles. The rest is eliminated by the mucous membrane of the large intestine and only traces by the kidneys. Iron is not excreted by the bile. The presence of iron in the blood in the amount resulting from medicinal administration produces no recognizable changes in normal individuals. Its salts with the stronger acids may act as gastro-intestinal irritants and astringents. The only systemic therapeutic action attributable to iron is the improvement in the number of red blood cells and in the amount of hemoglobin in them. For this reason it is indicated in anemia and in diseases of the blood in which anemia is a factor, such as leukemia. It is chiefly of value in anemia following hemorrhage, in chlorosis and in secondary anemias. In pernicious anemia it is useless.

Massa Ferri Carbonatis (Mass. Ferr. Carb.), Mass of Ferrous Carbonate, U. S. P. (Vallet's Mass).—Contains not less than 35 per cent. of ferrous carbonate, $FeCO_3$, with honey and sugar as preservatives, and sodium sulphate resulting from the process of manufacture.

Dosage: 0.25 Gm. or 4 grains.

Pilulae Ferri Carbonatis (Pil. Ferr. Carb.), Pills of Ferrous Carbonate, U. S. P. (Chalybeate Pills, Blaud's Pills, Ferruginous Pills).—These pills contain ferrous carbonate, potassium sulphate and sugar, with a smaller proportion of tragacanth and althea to make a mass. Each pill represents approximately 0.06 Gm. or 1 grain of ferrous carbonate.

Dosage: 2 pills.

Ferri Chloridum (Ferr. Chlor.), Ferric Chlorid, U. S. P. (Iron Perchlorid, Sesquichlorid of Iron).—$FeCl_3$. Used in medicine principally in the form of:

Tinctura Ferri Chloridi (Tr. Ferr. Chlor.), Tincture of Ferric Chlorid, U. S. P.—A hydro-alcoholic solution of $FeCl_3$, containing about 13 per cent. of the anhydrous salt, corresponding to about 4.5 per cent. of metallic iron.

Properties: Tincture of ferric chlorid is a bright amber-colored liquid, having a slightly ethereal odor, a very astringent taste and an acid reaction. It is miscible in all proportions with either water or alcohol.

Incompatibilities: It is incompatible with tannin, the vegetable astringents (which give an inky color to the mixture), and with alkalies and alkali carbonates. Tincture of ferric chlorid is also incompatible with iodids, from which it liberates iodin.

Action and Uses: Tincture of ferric chlorid is an astringent and is used in applications to the throat. It may be employed as a hematinic, but often disturbs digestion. It is sometimes given in infections like erysipelas, but it is doubtful if it has any special value in this disease.

Dosage: 0.5 Cc. or 8 minims, freely diluted. Injury to the teeth should be avoided by taking it through a glass tube or a straw. Equal parts of the tincture, glycerin and water form a useful local application in acute tonsillitis.

Ferri et Ammonii Citras (Ferr. et Ammon. Cit.), Iron and Ammonium Citrate, U. S. P. (Soluble Ferric Citrate, Ammonio-Ferric Citrate).—Should contain the equivalent of about 17 per cent. of Fe.

Properties: It forms thin, transparent, garnet-red scales, without odor, having a saline, mildy ferruginous taste; deliquescent in moist air. It is freely and readily soluble in water, but practically insoluble in alcohol.

Action and Uses: Iron and ammonium citrate is one of the more widely used of the soluble preparations of iron. It is practically nonastringent. It may be directed to be dissolved in water, aromatic elixir or syrup. It has been given hypodermically.

Dosage: 0.25 Gm. or 4 grains.

Ferri Iodidum, Ferrous Iodid.—FeI_2. A very unstable compound, easily undergoing oxidation. In order to preserve it in the ferrous condition it is commonly used in medicine in the form of syrup.

Syrupus Ferri Iodidi (Syr. Ferr. Iod.), Syrup of Ferrous Iodid, U. S. P. (Ferri Iodidi Syrupus, P. I.).—Contains about 5 per cent. by weight of FeI_2 and is practically identical with the international standard syrup of ferrous iodid.

Properties: Syrup of ferrous iodid occurs as a transparent pale green or yellowish green liquid having a sweet, strongly ferruginous taste and an acid reaction.

Incompatibilities: The syrup is very susceptible to oxidation, and is incompatible with alkali carbonates, acid salts and vegetable astringents. On exposure to light the cane-sugar of the syrup undergoes gradual inversion.

Action and Uses: Syrup of ferrous iodid has the general properties of both iron and iodid.

Dosage: 1 Cc. or 15 minims, containing approximately 0.008 Gm. or ⅛ grain of iron and 0.03 Gm. or ½ grain of iodin.

Ferri Phosphas (Ferr. Phos.), Ferric Phosphate, U. S. P. (Ferri Phosphas Solubilis, U. S. P. VIII, Soluble Ferric Phosphate).—Contains not less than 12 per cent. of Fe.

Properties: Ferric phosphate occurs in thin, bright-green transparent scales without odor, and having an acidulous, slightly saline taste. It is freely soluble in water, but practically insoluble in alcohol.

Incompatibilities: Strong acids decompose it with formation of the astringent ferric compound of the acid used. Like other soluble salts of iron it is incompatible with alkalies, alkali carbonates and vegetable astringents.

Action and Uses: Ferric phosphate has been recommended for the administration of iron in soluble form. It may be dissolved in water and flavored with simple elixir or sweetened with syrup.

Dosage: 0.25 Gm. or 4 grains.

Ferri Sulphas (Ferr. Sulph.), Ferrous Sulphate, U. S. P. (Iron Protosulphate, Green Vitriol).—$FeSO_4+7H_2O$.

Properties: Ferrous sulphate occurs as pale bluish-green crystals, without odor, having a saline, styptic taste. It is efflorescent in dry air. It is freely soluble in water (1: 1.4), but practically insoluble in alcohol.

Action and Uses: Ferrous sulphate is sometimes administered in pills as hematinic, but is used chiefly for pharmaceutical purposes, in the making of ferrous carbonate. The crude sulphate was formerly used extensively as a disinfectant and deodorant but is now seldom so employed.

Dosage: 0.2 Gm. or 3 grains.

Ferri Sulphas Exsiccatus (Ferr. Sulph. Exsic.), Exsiccated Ferrous Sulphate, U. S. P. (Dried Ferrous Sulphate.)—Contains not less than 80 per cent. of $FeSO_4$. One hundred parts represent approximately 150 parts of the crystalline substance. It is preferred for prescribing in pill form.

Properties: Exsiccated ferrous sulphate occurs as grayish-white powder, having the chemical properties of ferrous sulphate and being slowly but completely soluble in water.

Ferrum (Ferr.), Iron, U. S. P.—Metallic iron, Fe, is used pharmaceutically in the production of preparations of iron, but in medicine is used chiefly in the form of:

Ferrum Reductum (Ferr. Reduct.), Reduced Iron. U. S. P. (Ferrum Reductum, Iron by Hydrogen, Quevenne's Iron).—Contains not less than 90 per cent. of metallic iron (Fe).

Properties: Reduced iron occurs as a very fine, grayish-black powder without odor or taste, and permanent in dry air. It is insoluble in water or alcohol.

Dosage: 0.06 Gm. or 1 grain. Reduced iron is still widely used as a hematinic; it is given preferably in the form of powder, enclosed in capsules. It should be administered just before meals.

Formaldehydum, Formaldehyd.—CH_2O. Formaldehyd is a gas commonly obtained by oxidation of methyl alcohol. It is used in medicine in the form of:

Liquor Formaldehydi (Liq. Formaldehyd.), Solution of Formaldehyd, U. S. P.—Often referred to in literature under the proprietary name, formalin. An aqueous solution containing not less than 37 per cent. of formaldehyd, CH_2O, and varying amounts of methyl alcohol.

Properties: Solution of formaldehyd is a clear, colorless liquid, having a pungent odor and caustic taste. It is miscible in all proportions with water and alcohol. On standing it sometimes loses its transparency, owing to the separation of paraformaldehyd, a polymerization product of formaldehyd. Paraformaldehyd is also frequently formed on evaporation of the solution. Paraformaldehyd is a solid which is largely changed again into formaldehyd on heating.

Incompatibilities: Solution of formaldehyd is incompatible with oxidizing agents and with alkalies. With ammonia it forms hexamethylenamin.

Action and Uses: Formaldehyd is a powerful germicide, especially valuable in the form of gas because of its penetrating power, but it is active only in the presence of an abundance of moisture. The solution is germicidal in the strength of from 1 to 2 per cent. (percentages refer to amounts of absolute formaldehyd, HCHO), but it may

require from twenty to thirty minutes for it to act. In a strength of 1:5,000 it restrains the growth of many organisms, and in many cases a strength of 1:20,000 or 1:30,000 is sufficient to prevent the multiplication of bacteria. It hardens tissues and is used in histology for this purpose. It has a similar hardening effect on the living skin; it is very irritating and if repeatedly or continuously applied produces reddening, inflammation and necrosis. It is applied to the skin to restrain excessive sweating. From 1 to 10 per cent. solutions in alcohol are appropriate for this purpose. It is sometimes used for the disinfection of the hands, in connection with a solution of soap. The use of formaldehyd for the preservation of food is condemned on account of the disturbance of digestion which often follows its ingestion.

The principal application of formaldehyd is in room disinfection. For this purpose the vapor must be generated in a tightly closed room, containing plenty of moisture. Several methods have been described for generating the vapor, the most convenient being by the use of potassium permanganate which, when added to the solution, by decomposing a part of the formaldehyd, generates sufficient heat to vaporize the remainder. For an ordinary-sized room 2 pounds of potassium permanganate are placed in a vessel of at least 25 quarts capacity and a mixture of 1 quart of formaldehyd solution and 1 quart of water poured on it. Intense heat is generated by the reaction of the two chemicals, and by this heat the formaldehyd is vaporized. The heat is so great as sometimes to cause fire, against which due precautions should be taken. When the mixture has been made the operator should leave the room instantly. After the disinfection is complete the irritating fumes can be neutralized by ammonia.

Gelatinum (Gelat.), Gelatin, U. S. P.—The purified air-dried product of the hydrolysis of certain animal tissues, as skin, ligaments and bones, by treatment with boiling water.

PROPERTIES: Gelatin is an amorphous, more or less transparent solid, usually shredded or in thin sheets; colorless or with a slight yellowish tint, inodorous, or having a slight, characteristic odor and a somewhat insipid taste. Unalterable in the air when dry, but putrefying rapidly when moist or in solution. Gelatin is practically insoluble in cold water, but swells and softens when immersed in it, gradually absorbing from five to ten times its weight of water. It is soluble in boiling water, acetic acid and glycerin, but is practically insoluble in alcohol, ether or chloroform.

INCOMPATIBILITIES: Gelatin is coagulated by tannin, chlorin, bromin, mercuric chlorid, and many other metallic salts. If a solution of gelatin be mixed with formaldehyd, the gelatin is rendered hard and insoluble after evaporation and drying of the residue.

ACTION AND USES: Gelatin is largely used as a food product, though its value in this respect has probably been exaggerated. It has also been used to some extent in

solution by hypodermic injection to promote the formation of clot in aneurysms, and to arrest hemorrhage. Its efficiency, however, is very doubtful, and there is serious danger of infection from its use. Even boiling will not insure sterility as it may contain tetanus spores which are not destroyed by simple boiling. In pharmacy gelatin is used for the coating of pills, the making of gelatin capsules, gelatin disks, glycogelatin pastilles and for the making of glycerinated gelatin used as a base for suppositories.

Gentiana (Gentian.), Gentian, U. S. P. (Yellow Gentian Root).—The dried rhizome and roots of *Gentiana lutea.*

ACTION AND USES: Gentian is one of a large class of substances with a bitter taste which are credited with the power of stimulating the appetite and were formerly thought to stimulate the secretion of the gastric juice. Experiments show that this effect is not due, in any appreciable extent, to a direct action on the mucous membrane of the stomach, but can arise only reflexly from the action of the medicine on the nerves in the mouth, chiefly those of taste. Gentian and other bitters in moderate doses given a short time (five to fifteen minutes) before meals are useful in the treatment of loss of appetite and deficiency of the gastric secretions. If an effect be obtainable from it, this will show itself within a few days. It is most agreeably prescribed in form of:

TINCTURA GENTIANAE COMPOSITA (TR. GENTIAN. CO.), COMPOUND TINCTURE OF GENTIAN, U. S. P.—A hydro-alcoholic tincture representing 10 per cent. of gentian with bitter orange peel and cardamom seed used for flavor.

DOSAGE: 4 Cc. or 1 fluidram.

It may be prescribed with nux vomica as follows

℞ Tincture nucis vomicae..... 10.0 Cc.
Tincturae gentianae compositae.....ad 120.0 Cc.
M. Sig: One teaspoonful before meals.

Glucosum Anhydricum, Anhydrous D-Glucose, N. N. R.—Anhydrous dextrose, $C_6H_{12}O_6$.—A carbohydrate prepared by the action of dilute acids on starch and subsequent purification. It contains not less than 98 per cent. of anhydrous d-glucose.

PROPERTIES: Anhydrous d-glucose is a white, finely granular, odorless, sweet powder. It is permanent in air; freely soluble in water; slightly soluble in alcohol. An aqueous solution of anhydrous d-glucose (1: 20) should be clear, colorless, free from suspended matter and neutral to litmus.

ACTION AND USES: Glucose is a readily absorbed food. It may be administered in the form of enemas. It is useful for parenteral alimentation, by hypodermic and intravenous injection. Such injections also supply fluid, to sustain the blood volume temporarily, and produce diuresis. The injection of solutions of glucose has been proposed in infectious

diseases, and may have some value as food and as a means of introducing fluid, although this does not directly influence the course of the infection.

DOSAGE: 180 Gm. or 6 ounces daily. Intravenously from 250 to 300 Cc. or 8 to 10 fluidounces of a 15 to 20 per cent. solution in water or physiologic solution of sodium chlorid sterilized by boiling or in an autoclave; a 20 per cent. solution may be used with gum acacia in cases of hemorrhages and shock. As an enema, from a 5 to 12 per cent. solution is used.

Glycerinum (Glycerin.), Glycerin, U. S. P. (Glycerol).—$C_3H_5(OH)_3$. A liquid obtained by the decomposition of vegetable or animal fats or fixed oils. It contains not less than 95 per cent. of the trihydric alcohol, $C_3H_5(OH)_3$.

PROPERTIES: Glycerin occurs as a clear, colorless liquid, of a thick, syrupy consistence, smooth to the touch, odorless or having not more than a slight, characteristic odor, a sweet taste and producing a sensation of warmth in the mouth. It is readily miscible with water or alcohol.

ACTION AND USES: Glycerin is used in medicine chiefly as a solvent in preparing glycerites, and as a sweetening agent or vehicle in place of syrups. It also serves as a protective for the skin and mucous membranes.

SUPPOSITORIA GLYCERINI (SUPPOS. GLYCERIN.), SUPPOSITORIES OF GLYCERIN, U. S. P. — Each suppository contains approximately 3 Gm. or 45 grains of glycerin gelatinized by means of stearic acid soap.

ACTION AND USES: A glycerin suppository, or glycerin itself, when introduced into the rectum absorbs water from the surrounding tissues and by this irritation causes prompt evacuation of the rectum. Habitual use should be avoided.

Glycerylis Nitras, Glyceryl Trinitrate (Nitroglycerin, Trinitrin, Glonoin).—A compound obtained by the action of nitric acid on glycerol in the presence of sulphuric acid.

PROPERTIES: Nitroglycerin is a moderately volatile, explosive liquid slightly soluble in water, but quite soluble in alcohol. Therapeutically it is employed only in form of:

SPIRITUS GLYCERYLIS NITRATIS (SP. GLYCERYL. NIT.), SPIRIT OF GLYCERYL TRINITRATE, U. S. P. (Spirit of Glonoin, Spirit of Nitroglycerin).—An alcoholic solution containing about 1 per cent. by weight of glyceryl trinitrate.

PROPERTIES: Spirit of Glyceryl Nitrate is a clear, colorless liquid, having the odor and taste of alcohol. Caution should be exercised in tasting it, since even a small quantity of it is likely to produce violent headache.

INCOMPATIBILITIES: Water, in excess of equal amount, causes white turbidity. Aromatic elixir is therefore a better diluent for it. Alkalies and their carbonates decompose it.

Action and Uses: Although a nitrate, glyceryl nitrate has the physiologic action of nitrites but acts more slowly than amyl nitrite. It may be given when it is desired to effect a reduction of the arterial pressure, but it gradually becomes inefficient. It may be prescribed in arteriosclerosis, and in nephritis in which a high blood pressure is a prominent symptom. It is chiefly used with success in some cases of angina pectoris. It is sometimes combined with digitalis in order to produce vasodilatation and thus lessen the amount of work that the heart must do.

Dosage: Average 0.05 Cc. or 1 minim repeated as often as required, which may be quite frequently, as its action is fleeting. It is best to use half of the average dose at first, to avoid excessive action; and it may be necessary to use several times the average dose later. Unless the patient experiences fulness in the head shortly after taking the dose, the drug has not been given the opportunity to demonstrate what it might accomplish. It is most commonly prescribed in form of tablets, containing usually 0.0006 Gm., or 1/100 grain, each, of glyceryl nitrate. These are more effective when held in the mouth until absorption, which is rapid from the buccal mucous membrane, is complete. If tolerance is acquired, it is advisable to intermit the administration, so that the response may be restored.

Glycyrrhiza (Glycyrrh.) Glycyrrhiza, U. S. P. (Licorice, Liquorice Root).—The dried rhizome and root of *Glycyrrhiza glabra typica* (Spanish licorice), or of *Glycyrrhiza glabra glandulifera* (Russian licorice). Used in medicine chiefly as a vehicle and principally in the form of:

Fluidextractum Glycyrrhizae (Fldext. Glycyrrh.), Fluidextract of Glycyrrhiza, U. S. P. (Fluidextract of Licorice).—An aqueous extract of glycyrrhiza preserved by means of glycerin and alcohol. It is usually mixed in some such proportion as 1:7 with syrup or water or both, but is incompatible with acid.

A simple mixture of 12 Cc. of fluidextract of glycyrrhiza and 88 Cc. of aromatic elixir is official in the U. S. P. as "elixir glycyrrhizae."

Glycyrrhiza in the form of powder is used as a flavoring agent and vehicle in connection with:

Pulvis Glycyrrhizae Compositus, which see under **Senna.**

Guaiacol, Guaiacol, U. S. P.—Guaiacol is one of the chief constituents of wood-tar creosote.

Properties: Guaiacol is a colorless or yellowish, strongly refractive liquid or a nearly colorless crystalline solid, having an agreeable aromatic odor. It becomes darker on exposure to light and air. Guaiacol is soluble in water (1: 53), and miscible with alcohol in all proportions.

Action and Uses: Guaiacol is antiseptic and germicidal, but is milder than creosote. When rubbed on the skin it

is absorbed. When given in this way it is an active antipyretic, but its action is not easily controlled. It is an intestinal antiseptic and also an expectorant. It is not excreted by the lungs, however.

DOSAGE: Guaiacol may be given in emulsion or in the form of capsules. The initial dose should not exceed 0.1 Cc. or about 1½ minims. This may be gradually increased to 0.6 Cc. or 10 minims, if well borne. It is sometimes applied to the pharynx as a 50 per cent. solution in glycerin. The external use of guaiacol as an antipyretic is not to be recommended on account of the symptoms of collapse which sometimes follow these applications.

Guaiacolis Carbonas (Guaiacol. Carb.), Guaiacol Carbonate, U. S. P.—A guaiacol derivative $[C_6H_4(OCH_3)]_2CO_3$.

PROPERTIES: Guaiacol carbonate is a white crystalline powder of neutral reaction, almost tasteless and odorless. It is practically insoluble in water, but is soluble in alcohol (1: 60). It is decomposed readily with the liberation of guaiacol.

INCOMPATIBILITIES: It is incompatible with alkaline hydroxids.

ACTION AND USES: Guaiacol carbonate is inactive until decomposed with the liberation of guaiacol. This occurs only in the presence of putrefactive organisms so that in the intestine it acts only when an antiseptic is needed and the excess fails to be absorbed and is excreted with the feces. Consequently it is ordinarily not poisonous. It is used internally as a tasteless and nonpoisonous substitute for guaiacol.

DOSAGE: 1 Gm. or 15 grains. It may be given in powders, capsules or cachets.

Hexamethylenamina (Hexam.), Hexamethylenamin, U. S. P. (Hexamethylene-tetramin).—Hexamethylenamin or hexamethylenetetramin, $(CH_2)_6N_4$, is a condensation product of ammonia and formaldehyd.

PROPERTIES: Hexamethylenamin forms colorless, lustrous, odorless crystals, freely soluble in water (1: 1.5) and alcohol (1: 12.5). The aqueous solution has an alkaline reaction. Hexamethylenamin is a base which combines with acids to form salts. These salts tend to lose formaldehyd, and most acids decompose the base completely with the liberation of formaldehyd. Even in aqueous solution a slow separation of formaldehyd occurs. The basic properties of hexamethylenamin are so pronounced that it displaces ammonia and other weak bases from their combinations.

INCOMPATIBILITIES: Hexamethylenamin is incompatible with acids which liberate formaldehyd and with salts of ammonium from which it separates ammonia. Acid salts like acid sodium phosphate and combined acids like acetylsalicylic acid (aspirin) react with it like other acids. It is also incompatible with tannin and mercuric chlorid, which precipitate hexamethylenamin.

Action and Uses: Hexamethylenamin is not antiseptic. It produces no marked physiologic effects, except those of formaldehyd, to which it gives rise in the presence of free acid. It is chiefly excreted in the urine; and, when the urine is acid, hexamethylenamin is decomposed, yielding formaldehyd. This product exercises an antiseptic action on the urine and on the surface of the mucous membrane of the genito-urinary tract, which may become irritated should excess of the formaldehyd be produced. When the urine is alkaline, the decomposition does not occur and the drug is then ineffective. The chief use of hexamethylenamin is as a urinary antiseptic. While it tends to free the urine from micro-organisms, and in some cases causes pus to disappear, it cannot be expected to act on micro-organisms located below the surface. Its chief value is as a prophylactic against infection in catheterization and in operations on the urinary organs. It is also employed in typhoid fever as a prophylactic to the bacilluria. As it has at times produced albuminuria and hematuria, it should be used with caution in cases in which inflammation of the kidney is present or threatened, or when the urinary acidity is abnormally high. Hexamethylenamin is also excreted in the bile, the cerebrospinal fluid and other serous fluids, and by the mucous membranes of the respiratory tract and of the middle ear. Since these fluids are not acid, hexamethylenamin cannot exert any antiseptic action there. Though formaldehyd is a solvent of uric acid, the use of hexamethylenamin in the hope of dissolving uric acid calculi, tophi, gravel, etc., has been disappointing. It has been shown that ordinary doses of hexamethylenamin do not confer any solvent action on the urine. Doses of 4 Gm. make the urine distinctly more solvent, but not more so than rendering the urine slightly alkaline, as may easily be done by administering sodium bicarbonate or acetate.

Dosage: 0.3 Gm. or 5 grains, or even double this amount, in half a glass of water every four hours. If the urine is not acid, sodium acid phosphate in doses of 1 to 2 Gm. should be administered every four hours, midway between the doses of hexamethylenamin. Enough sodium acid phosphate should be used to render the urine acid, but not enough to cause diarrhea.

Homatropinae Hydrobromidum (Homatrop. Hydrobr.), Homatropin Hydrobromid, U. S. P. (Homatropin Bromid).—The hydrobromid of an alkaloid, tropin mandelate, produced synthetically.

Properties: It usually occurs as a white, odorless, crystalline powder, having a bitter taste. Caution must be observed in tasting it. It is freely soluble in water (1: 6) and soluble in alcohol (1: 40).

Incompatibilities: Homatropin hydrobromid has the ordinary incompatibilities of the salts of alkaloids.

Action and Uses: The actions of homatropin are identical with those of atropin, except that the mydriasis produced by it occurs more promptly and disappears in about eighteen hours. When applied freely to the conjunctiva it may be absorbed so that the bitter taste can be perceived, but the throat does not become dry as after atropin. The effect of this drug is increased by mixture with cocain.

Dosage: 0.5 mg. or $\frac{1}{120}$ grain. Homatropin is used chiefly as a mydriatic in place of atropin. It may be employed in aqueous solution of 2 per cent. strength, or a drop of a 1:500 solution may be introduced into the conjunctival sac every five minutes for five times to produce a maximum dilatation in three quarters of an hour. This will return to normal in from fourteen to eighteen hours.

Hydrargyri Chloridum Corrosivum (Hydrarg. Chlor. Corr.), Corrosive Mercuric Chlorid, U. S. P. (Bichlorid of Mercury, Corrosive Sublimate, Mercuric Chlorid, Perchlorid of Mercury).—Contains not less than 99.5 per cent. of $HgCl_2$.

Properties: Mercuric chlorid occurs in the form of heavy colorless crystals or a heavy white powder having an acrid and persistent metallic taste. It is permanent in the air. It is very slowly soluble in water (1: 13.5), and freely soluble in alcohol (1: 3.8). Ammonium chlorid, sodium chlorid, tartaric acid and citric acid enhance its solubility in water.

Incompatibilities: Mercuric chlorid is precipitated from its solutions by albumin, but redissolves in an excess of the albumin solution. Albumin in the form of egg-white forms an antidote of limited value. As the mercuric albuminate formed is still toxic, the antidote should be followed by evacuation of the stomach.

Mercuric chlorid is incompatible with soluble carbonates and hydroxids, forming insoluble mercuric oxid, and with small amounts of iodids, forming mercuric iodid or complex mercuric iodids. As large excess of iodid dissolves these, prescriptions containing such combination are permissible. It is incompatible with many alkaloids and other organic compounds. It is reduced to calomel or metallic mercury by iron, zinc and reducing agents in general. It dulls and tarnishes surgical instruments.

Action and Uses: Mercuric chlorid is chiefly used as a germicide and an antiseptic. It is also sometimes used as a specific antisyphilitic agent. In a proportion of 1:20,000 it kills non-spore bearing bacteria and in the proportion of 1:300,000 inhibits the growth of many forms. Spores of *Bacillus anthracis* are killed by a solution of 1:1,000. Its disinfectant action is limited by its deficient penetration and by the fact that it is greatly reduced by combination with organic matter. Mercuric chlorid is irritant to the

skin, setting up a dermatitis. A sufficient amount may be absorbed from the skin to produce serious poisoning. The effects of the poison when absorbed from the skin or mucous membranes are seen in ulcerative stomatitis and diarrhea, characterized by the passage of frequent foul-smelling and bloody stools resembling those of dysentery, various nervous symptoms, marked weakness, irritation of the kidneys with albumin and casts in the urine, leading to anuria, etc. When taken in poisonous doses by the mouth it produces, in addition, irritation and ulceration of the mouth and throat, vomiting and corrosion of the mucosa of the stomach and intestines. Dilute solutions of mercuric chlorid are used by hypodermic or intramuscular injection in the treatment of syphilis. The injections must be repeated daily and have the disadvantage of causing considerable pain. Mercuric chlorid is used as a local application to the skin in some forms of skin disease, sometimes as an antiseptic, but also for the purpose of producing exfoliation of the epidermis. It is sometimes used in 1 per cent. alcoholic solution as an application to corneal ulcers. In the proportion of 1:5,000 it may be added to collyria to prevent fungus growths.

DOSAGE: From 0.002 to 0.01 Gm., or from $\frac{1}{30}$ to $\frac{1}{6}$ grain, in solution or in pill form. As an antiseptic application it may be used in solutions varying in strength from 1:20,000 to 1:2,000. For disinfection of clothing a solution of 1:1,000 may be employed. To excite dermatitis and exfoliation, solutions varying in strength from 1:1,000 to 1:200 may be used, but caution should always be exercised in employing the stronger solutions for fear of absorption of the poison. The injection of mercuric chlorid solutions into the body cavities or its application to raw surfaces or mucous membranes should be undertaken only with the greatest caution.

Hydrargyri Chloridum Mite (Hydrarg. Chlor. Mit.), Mild Mercurous Chlorid, U. S. P. (Mercurous Chlorid, Calomel, Protochlorid of Mercury, Subchlorid of Mercury).—Contains not less than 99.6 per cent. of HgCl.

PROPERTIES: Mild mercurous chlorid is a white impalpable powder, becoming yellowish-white on trituration with strong pressure, odorless, tasteless and permanent in the air. It is practically insoluble in water, alcohol or ether. It undergoes changes when exposed to the action of light or under the influence of alkaline chlorids, bromids or iodids, by which mercuric salts are more or less rapidly formed. The mercuric salt enters into solution in combination with the salt of the alkali metal present. Alkaline hydroxids convert it into mercurous oxid; ammonia forms with it a mixture of mercury and mercuric ammonium chlorid.

INCOMPATIBILITIES: Calomel is incompatible with alkalies, with oxidizing acids like nitric acid and also with soluble bromids and iodids. The fear that nonoxidizing acids like hydrochloric acid will form mercuric chlorid from it is unfounded. Calomel is not incompatible with such acids.

Action and Uses: Mild mercurous chlorid is not irritating to the mucous membrane of the mouth, esophagus and stomach, but it provokes bowel movements by a slow action, thought to be due to a partial change into a mercuric salt or a protein compound. The absorption of the mercuric salt may produce symptoms of subacute mercurial poisoning, the chief indications of which are pain in the abdomen, loose passages, salivation, loosening of the teeth, swelling, soreness and ulceration of the gums, foul breath and general malaise. Calomel was formerly supposed to have a cholagogue action, but it does not increase the quantity of bile secreted, although by its cathartic action it may increase temporarily the amount poured out by the intestine. The stools resulting from the action of calomel are frequently greenish, because the bilirubin in the intestinal contents, being hurried through the colon, fails to undergo the change into urobilin which normally occurs. The change in color may also be due in part to the formation of mercuric sulphid. Calomel is useful as an intestinal antiseptic. It is considered valuable as a cathartic at the beginning of mild catarrhs of the stomach and intestines. It is also frequently used in conjunction with the more active salines to empty the bowels in cases of infection, or toxemia. It is frequently administered as a laxative when the stomach is irritable because it is retained better than other cathartics. Calomel is sometimes an excellent diuretic in cardiac dropsy, in which condition its absorption must be secured through the control of the purgative action. It is of much less value in other forms of dropsy. It is applied externally to sluggish ulcers, and is used by insufflation on the cornea for ulceration or opacities, phlyctenular conjunctivitis, etc.

Dosage: Only a small portion of the calomel is absorbed, so that minute doses are generally effective. From 0.005 to 0.02 Gm., or from 1/12 to 1/3 grain may be given every half hour or hour until from 0.1 to 0.2 Gm., or from 1½ to 3 grains have been given. The calomel should be followed in a few hours or the next morning by a saline cathartic. When calomel is used externally, care should be taken that no iodids are administered internally at the same time, because the presence of iodids in the secretions, for example, tears, may cause the formation of a mercuric salt and induce great irritation.

Hydrargyri Iodidum Flavum (Hydrarg. Iod. Flav.), Yellow Mercurous Iodid, U. S. P. (Mercurous Iodid, Protiodid of Mercury, Yellow Iodid of Mercury, formerly also called "Green Iodid of Mercury").—Contains not less than 99 per cent. of HgI.

Properties: Mercurous iodid is a bright yellow, amorphous powder, odorless and tasteless. By exposure to light it becomes darker, in proportion as it undergoes decomposition into mercuric iodid and metallic mercury. It is almost insoluble in water and wholly insoluble in alcohol.

Incompatibilities: Mercurous iodid is incompatible with oxidizing agents, alkalies and the haloid salts of the alkali metals (chlorids, bromids or iodids), which tend to decompose it with the formation of mercuric salts. Alkali iodids decompose mercurous iodid with formation of metallic mercury and soluble alkali mercuric iodid.

Action and Uses: Mercurous iodid is used to secure the constitutional effects of mercury by oral administration, especially in the treatment of syphilis. Injection and inunction methods are so much more effective, however, that the oral treatment of syphilis tends to become obsolete. Taken internally, the effects of mercurous iodid are much the same as those of calomel, although it is not so likely to produce diarrhea or salivation as the latter.

Dosage: For oral administration in syphilis, mercurous iodid is best given in pill form in doses gradually increasing until slight toxic symptoms appear, such as diarrhea, tenderness of the gums, pains in the abdomen, etc. During its administration careful attention should be given to cleanliness of the mouth and skin. The teeth should be kept in good order, and soreness of the gums should be the signal for interrupting temporarily the administration of the remedy, or greatly reducing the dose. The initial dose should not exceed 0.015 Gm. or ¼ grain in the form of a tablet, pill or powder, three times a day after meals, and this should be increased by the addition of 0.008 Gm. or ⅛ grain daily to the limit of tolerance.

Hydrargyri Iodidum Rubrum (Hydrarg. Iod. Rub.), Red Mercuric Iodid, U. S. P. (Biniodid of Mercury, Mercuric Iodid, Red Iodid of Mercury).—Contains not less than 99 per cent. of HgI_2.

Properties: Mercuric iodid is a scarlet-red powder, odorless and tasteless, and permanent in the air. It is nearly insoluble in water, but slightly soluble in alcohol (1: 115). It is rendered soluble in the presence of soluble iodids, such as an equal weight of potassium iodid with formation of potassium mercuric iodid.

Incompatibilities: Red mercuric iodid is incompatible with alkalies and their carbonates and with alkaloids and their salts.

Action and Uses: Mercuric iodid is used as an antiseptic and germicide. It is more powerfully antiseptic than mercuric chlorid. It may be applied in potassium iodid solution. It is also used for the internal administration of mercury. A solution of mercuric iodid in sodium iodid (mercuric iodid 1 Gm., sodium iodid 3 Gm., water to make 100 Cc.) is used as a means of administering mercury by intramuscular injection.

Dosage: 0.003 Gm. or 1/20 grain three times a day. It is frequently formed for internal administration by the prescription of a mixture of corrosive mercuric chlorid and potassium iodid.

℞ Hydrargyri chloridi corrosivi..... 0.060 Gm.
Potassii iodidi ..... 6.0 Gm.
Aquae ..... 100.0 Cc.

M. Sig.: Teaspoonful in tumblerful of milk three times daily after meals.

Hydrargyri Oxidum Flavum (Hydrarg. Oxid. Flav.), Yellow Mercuric Oxid, U. S. P.—Contains not less than 99.5 per cent. of HgO.

PROPERTIES: Yellow mercuric oxid is a light orange-yellow, amorphous powder, odorless and having a somewhat metallic taste. It is permanent in the air, but turns darker on exposure to light. It is nearly insoluble in water and in alcohol.

INCOMPATIBILITIES: Yellow mercuric oxid is incompatible with acids, which dissolve it, forming mercuric salts.

ACTION AND USES: Yellow mercuric oxid is employed externally as an antiseptic and stimulant chiefly in blepharitis, phlyctenular conjunctivitis, etc. Its value in treatment of styes lies probably in its preventing the dissemination of the infection to other glands.

DOSAGE: Yellow mercuric oxid is generally used in form of ointment varying in strength from 0.1 to 2 per cent.

UNGUENTUM HYDRARGYRI OXIDI FLAVI (UNG. HYDRARG. OXID. FLAV.), OINTMENT OF YELLOW MERCURIC OXID, U. S. P.—A 10 per cent. mixture of yellow mercuric oxid, with water, hydrous wool-fat and petrolatum.

DOSAGE: For use in the eye it should be diluted with from 5 to 100 parts of petrolatum so as to reduce the percentage of mercuric oxid to from 2 to 0.1 per cent.

Hydrargyri Salicylas (Hydrarg. Salicyl.), Mercuric Salicylate, U. S. P. (Mercuric Subsalicylate).—A mercuric salt of salicylic acid in which one atom of mercury is combined with one molecule of salicylic acid. It contains from 54 to 59.5 per cent. of Hg.

PROPERTIES: Mercuric salicylate is a white or slightly yellowish or pinkish amorphous powder, tasteless, odorless and neutral to litmus paper. It is nearly insoluble in water or alcohol, but soluble at the ordinary temperature in solutions of sodium hydroxid or sodium carbonate with the formation of a double salt.

INCOMPATIBILITIES: Mercuric salicylate is incompatible with iodids and (probably) other halogen salts.

ACTION AND USES: Mercuric salicylate is used as an antiseptic and for producing the internal actions of mercury especially by intramuscular injection in the treatment of syphilis.

DOSAGE: Mercuric salicylate is given by intramuscular injection in a 10 per cent. suspension in vegetable fats; 0.6 Cc. or 10 minims of this suspension is injected once in four days. It is held by many clinicians that the

introduction by the mouth of sufficient mercury to eradicate syphilis thoroughly is practically impossible. The benzoate and the succinimid of mercury are also administered by intramuscular injection; they differ from the salicylate in that they are used as aqueous solutions. They are more absorbable and the injections are, therefore, made more frequently, and with smaller doses.

Hydrargyrum (Hydrarg.), Mercury, U. S. P. (Quicksilver).—Contains not less than 99.5 per cent. of Hg.

PROPERTIES: Metallic mercury in its ordinary form is a shining, silver-white, volatile and fluid metal without odor or taste. In its massive form it has comparatively little physiologic action and is not poisonous even in large quantities. When it has been reduced to a fine state of subdivision it is capable of absorption either by the skin or mucous membranes, and then produces the ordinary pharmacologic effects of its salts. It is also very active in the form of vapor.

Mercury is widely used in the form of the following mixtures:

HYDRARGYRUM CUM CRETA (HYDRARG. CUM CRET.), MERCURY WITH CHALK, U. S. P. (Gray Powder).—A powder containing about 38 per cent. of mercury with clarified honey and prepared chalk.

PROPERTIES: By long shaking and trituration of the mercury with the other ingredients it is reduced to so fine a state of subdivision that distinct globules cannot be seen with a lens magnifying 4 diameters. The preparation then forms a light gray, slightly adhesive powder, with little odor, and a slightly sweetish taste.

ACTION AND USES: This preparation is used in general in the same way as calomel, but is believed to affect the intestines less, partly because of the antagonizing influence of the chalk. It is often employed to secure the constitutional effects of mercury in cases of infantile and hereditary syphilis.

DOSAGE: 0.25 Gm. or 4 grains, containing approximately 0.1 Gm. or 1½ grains of metallic mercury.

MASSA HYDRARGYRI (MASS. HYDRARG.), MASS OF MERCURY, U. S. P. (Blue Mass).—A mixture of 33 per cent. of mercury with glycyrrhiza, althea, glycerin and honey of rose. The mercury is reduced to such fine division that globules are not visible under a magnification of 10 diameters.

ACTION AND USES: The effects of and indications for this preparation are much the same as those of calomel.

DOSAGE: 0.250 Gm. or 4 grains.

UNGUENTUM HYDRARGYRI (UNG. HYDRARG.), MERCURIAL OINTMENT, U. S. P.—A mixture of 50 per cent. of mercury with prepared suet, benzoinated lard and 2 per cent. of oleate of mercury. The mercury is reduced by trituration to such fineness that globules are no longer visible under a lens magnifying 10 diameters.

UNGUENTUM HYDRARGYRI DILUTUM (UNG. HYDRARG. DIL.), DILUTED MERCURIAL OINTMENT, U. S. P. (Blue Ointment, Hydrargyri Unguentum, P. I.).—Blue ointment is made by mixing 2 parts of mercurial ointment with 1 part of petrolatum. It represents approximately 33 per cent. of metallic mercury and conforms to the strength, though not to the composition, of the international standard for mercurial ointment.

ACTION AND USES: Mercurial ointment is a parasiticide; it is employed for the destruction of lice, but other measures are more cleanly and less likely to cause irritation. The rubbing of mercurial ointment into the skin allows the absorption of a part of the mercury, thus securing its constitutional effects. It ranks next to the intramuscular injections in antisyphilitic efficacy.

DOSAGE: 2 Gm. or 30 grains of the ointment should be rubbed into a chosen area of the skin at night, and the part anointed should be cleansed by washing in the morning. A new area of the skin should be chosen for inunction the next evening. If dermatitis is excited by this method of application it will subside rapidly as a rule on washing with a warm alkaline lotion and dusting with some bland powder. If irritation seems likely to arise, the ointment may be diluted with an equal part of hydrous wool fat.

Hydrargyrum Ammoniatum (Hydrarg. Ammon.), Ammoniated Mercury, U. S. P. (White Precipitate).—A mercuric ammonium chlorid produced by the precipitation of a solution of mercuric chlorid by a solution of ammonia; it should correspond to from 78 to 80 per cent. of metallic mercury.

PROPERTIES: Ammoniated mercury forms white pulverulent pieces or a white amorphous powder, having an earthy, afterward styptic and metallic taste. It is practically insoluble in water or in alcohol, but is gradually decomposed by washing with water. It is readily soluble in warm acids with decomposition. It also dissolves in cold solution of ammonium carbonate.

Ammoniated mercury is chiefly used in the form of:

UNGUENTUM HYDRARGYRI AMMONIATI (UNG. HYDRARG. AMMON.), OINTMENT OF AMMONIATED MERCURY, U. S. P. (White Precipitate Ointment).—A mixture of 10 per cent. of ammoniated mercury with white petrolatum and hydrous wool-fat.

ACTION AND USES: Ammoniated mercury in the form of an ointment of from 2 to 10 per cent. is used as an antiseptic and local stimulant. In the strength of from 3 to 5 per cent. it is an efficient and nonirritating application for small areas of suppurating dermatitis. In stronger proportions (from 8 to 12 per cent.) it is a useful stimulating ointment for exciting a healthy inflammatory reaction, as in psoriasis. In seborrhea it may be applied after removal of crusts, in the form of a 2 per cent. ointment.

Hydrogenii Dioxidum, Hydrogen Dioxid (Hydrogen Peroxid).—Hydrogen dioxid or peroxid, H_2O_2, is a syrupy liquid, which has a strong tendency to decompose into water and oxygen in the presence of oxidizable substances and of ferments capable of carrying oxygen. It is soluble in water, alcohol and ether. It decomposes readily when heated. Strong solutions are more stable than are dilute solutions.

Liquor Hydrogenii Dioxidi (Liq. Hydrog. Diox.), Solution of Hydrogen Dioxid, U. S. P. (Aqua Hydrogenii Dioxidi, U. S. P. VIII, Solution of Hydrogen Peroxid).—A slightly acid, aqueous solution of H_2O_2 (approximately 3 per cent.) corresponding to about 10 volumes of available oxygen.

Properties: Solution of hydrogen dioxid is a colorless liquid without odor, but having a slightly acidulous taste and producing a peculiar sensation and thick froth in the mouth. It is prone to deteriorate on keeping.

Action and Uses: Hydrogen dioxid kills bacteria in pure cultures because of its oxidizing power. In contact with tissues, however, its germicidal power is very limited, owing to the fact that other organic matter is as destructive to it as are bacteria. Its chief value is as a cleansing agent for suppurating wounds and inflamed mucous membranes. It is especially useful for this purpose because of the development of gas, which tends to loosen adherent deposits.

Dosage: Solution of hydrogen dioxid is usually applied diluted with from 1 to 4 volumes of water. It should be used with care in deep cavities. A free opening for the escape of foam and gas should be provided.

Hyoscyamus (Hyosc.), Hyoscyamus, U. S. P. (Henbane, Hyoscyami folium, P. I.).—The dried leaves and flowering tops of *Hyoscyamus niger* yielding not less than 0.065 per cent. of the alkaloids of hyoscyamus.

Tinctura Hyoscyami (Tr. Hyosc.), Tincture of Hyoscyamus, U. S. P.—One hundred Cc. represent the soluble constituents of 10 Gm. of hyoscyamus in diluted alcohol, and contain approximately 0.0065 Gm. of the total alkaloids of hyoscyamus.

Action and Uses: The uses of tincture of hyoscyamus are similar to those of tincture of belladonna.

Dosage: From 0.6 to 2 Cc. or from 10 to 30 minims.

Hypophysis Sicca (Hypophysis Sic.), Desiccated Hypophysis, U. S. P. (Desiccated Pituitary Body).—The posterior lobe obtained from the pituitary body of cattle, cleaned, dried and powdered.

PROPERTIES: Amorphous powder having a characteristic odor. It is only partially soluble in water. Preferably used in the form of:

LIQUOR HYPOPHYSIS (LIQ. HYPOPHYSIS), SOLUTION OF HYPOPHYSIS, U. S. P. (Solution of the Pituitary Body).—A solution containing the water-soluble principle or principles from the fresh posterior lobe of the pituitary body of cattle; commercial preparations are generally supplied in sealed ampules.

PROPERTIES: Solution of hypophysis is a clear, colorless liquid having a faint but characteristic odor.

ACTION AND USES: Solution of hypophysis stimulates plain muscle, especially that of the blood vessels and the uterus. Injected subcutaneously or intramuscularly, it is used to stimulate uterine contractions in labor. It should not be employed during the first stage of labor, because, if the os uteri is not fully open, the energetic contractions may cause rupture of the uterus. It has also been recommended in uterine hemorrhage and certain cases of pulmonary hemorrhage, in shock and various other conditions of low blood pressure, and in postoperative intestinal paresis. It has been found to possess marked, though merely temporary, antidiuretic properties in diabetes insipidus. Its administration by mouth is practically ineffective.

DOSAGE: 1 Cc. or 15 minims, given by subcutaneous or intramuscular injection.

Insulin, Insulin, N. N. R.—An aqueous solution of an active principle from pancreas which affects sugar metabolism. The strength of insulin is expressed in "units," one unit being one-third of the amount required to lower the blood sugar to an average of 0.045 per cent. over a period of 5 hours in a normal rabbit weighing 2 kg. which has been previously starved for 24 hours.

PROPERTIES: Insulin is a clear, colorless or almost colorless liquid. A statement of activity and also the date of expiration of patency accompanies each package.

ACTIONS AND USES: Insulin lowers the blood sugar in normal rabbits causing characteristic symptoms when a low level is reached, which symptoms are overcome by the administration of glucose. It prevents the hyperglycemia due to pigure, asphyxia and epinephrin. It increases the sugar consumption of the isolated mammalian heart. It causes glycogen to be deposited in the liver of diabetic animals fed with carbohydrates, and raises the respiratory quotient of such animals. It effects the metabolism of fat in diabetic animals and causes the acetone bodies to disappear from the urine. It has been demonstrated that the administration of insulin to diabetic dogs and to man in severe cases of diabetes mellitus restores to the body the

lost ability to oxidize carbohydrate, and that glycogen is again stored in the liver. If insulin is administered at suitable intervals to a person suffering from diabetes mellitus, the blood sugar is maintained at a normal level and the urine remains free of sugar; fat is also burned and as a result, ketone bodies do not appear in the urine and diabetic acidosis and coma are prevented.

The administration of insulin is indicated in cases of diabetes mellitus which cannot be controlled at a satisfactory level by dietetic treatment. In such cases, with proper regulation of the diet, insulin should be administered in such amounts as to prevent glycosuria and a too great hyperglycemia. In some cases the dosage of insulin may be gradually decreased as the body power of utilizing carbohydrate returns toward normal.

Overdosage of insulin is followed by the development of serious symptoms which demand immediate treatment. The patient complains of weakness and fatigue and a feeling of nervousness or tremulousness. This is followed by profuse sweating, which is the most characteristic sign of overdosage. There is sometimes pallor or flushing. In the more severe forms there is acute distress with mental disturbances and even unconsciousness. These symptoms are relieved by the administration of some form of available carbohydrate by mouth or stomach tube, or, if the patient is comatose, by the intravenous injection of from five to twenty grams of pure glucose in a five to fifty per cent. sterile solution. (The intravenous injection of glucose may at times be obviated by the subcutaneous injection of 0.3 Cc. to 0.6 Cc. of a 1 : 1,000 solution of epinephrin chlorid, but this must always be followed by carbohydrates by mouth.)

Dosage: Insulin is administered subcutaneously in the arm, thigh or buttock, one, two or three times a day, 15 to 60 minutes before a meal, depending upon the rapidity of absorption of carbohydrate from the stomach and insulin from the subcutaneous tissue, as estimated after observation of each individual patient. The dosage of insulin which is required to reduce the blood sugar to approximately the normal level should be determined for each patient by estimations of blood sugar before and after administration of insulin. If insulin must be administered without adequate control of blood sugar, it is safer to have a blood sugar somewhat above normal with a transient glycosuria, than to have the urine sugar free and the blood sugar at or below normal. The average dosage depends on the diet and severity of the disease. Small doses of a few units should be used in the beginning and this increased as may be necessary. When sugar is no longer found in the urine, the dose of insulin is decreased; the attempt being made to get rid of the noon dose by shifting the carbohydrate as far as feasible to breakfast and supper, and decreasing the noon insulin by a unit each day.

In cases of coma or severe acidosis, an initial dose of approximately 15 units of insulin may be given, followed subsequently at 3 to 4 hours intervals by doses of 10 units with the simultaneous administration in each case of 10 to 20 grams of glucose. More than 60 units in twelve hours are rarely indicated.

In a small number of cases of diabetes mellitus, insulin can be discontinued, particularly with patients who receive it because of an exacerbation caused by complications, and where diabetes is of recent onset (though perhaps the latter should receive it intermittently as a prophylactic against increasing severity).

Iodoformum (Iodof.), Iodoform, U. S. P.—Tri-iodomethane, CHI_3, usually prepared by the action of iodin on alcohol or acetone in the presence of an alkali or alkali carbonate.

PROPERTIES: Iodoform occurs as a fine, lemon-yellow powder or lustrous crystals having a peculiar, very penetrating and persistent odor, and an unpleasant, slightly sweetish and iodin-like taste. It is very slightly soluble in water (1: 10,000), soluble in alcohol (1: 60), and very soluble in ether (1: 7.5). It is also somewhat soluble in fixed oils.

INCOMPATIBILITIES: Iodoform is incompatible with calomel, silver salts, chlorates and nitrites.

ACTION AND USES: Iodoform is a mild local analgesic, antiseptic and stimulant. When absorbed through the skin or from denuded surfaces it produces intoxication, which is not evident until after the lapse of some time. When swallowed it is partly decomposed with the production of iodids, which produce their ordinary effects. Part of the drug is absorbed, however, in a form of combination not yet understood, and produces symptoms that are different from those ordinarily caused by iodin. The symptoms are restlessness, anesthesia, sometimes unconsciousness, occasional convulsions, hallucinations and delusions of persecution, rapid pulse and elevated temperature; collapse, coma and death may follow. Iodoform is slowly excreted, iodin compounds appearing in the urine for several days after a single dose. It is employed as a mildly antiseptic and analgesic dusting powder for open wounds. It has also been administered by injection into tuberculous joints, usually in form of a 10 per cent. suspension (incorrectly called "Iodoform Emulsion"), in sterile oil or other vehicle. Several odorless organic compounds of iodin have been devised as substitutes for iodoform, but they are uniformly less active.

DOSAGE: 0.25 Gm. or 4 grains. It is usually applied externally in the form of a dusting powder, but may be used in the form of a suspension, as an ointment or as a surgical dressing in the form of gauze. In the treatment of hemorrhoids it is employed in the form of suppositories.

Iodum, Iodin, U. S. P.—Contains not less than 99.5 per cent. of I.

PROPERTIES: Iodin is a heavy, bluish-black, dry and friable solid crystallizing in rhombic plates, having a metallic luster, a distinctive odor and a sharp and acrid taste. It is readily volatile. It is very slightly soluble in water (1: 2,950), but soluble in alcohol (1: 10). It is also soluble in solutions of iodids.

INCOMPATIBILITIES: Iodin is incompatible with alkalies and alkali carbonates, the alkaloids, with tannin and other vegetable astringents and with most volatile oils, particularly the terpene-containing oils.

ACTION AND USES: *Cutaneous:* Iodin irritates the skin, causing a sensation of heat and itching. In concentrated solutions it may blister or even corrode, but it acts more slowly than many other irritants. It penetrates into the deeper layers of the skin and small quantities are absorbed. Iodin is applied to the skin for the purpose of exciting congestion of the underlying tissues. This congestion is supposed to cause the absorption of exudates. The benefit is probably overrated. It is also used by surgeons for the disinfection of the skin, for which it is considered to be the most desirable agent. The application is made by painting the tincture or a 3 per cent. alcoholic solution over the area to be disinfected. The skin must be dry; wet applications should not previously be used. It is also employed in various skin diseases for the purpose of producing an acute inflammatory reaction in the skin, and causing the destruction of bacteria. Its effect on bacteria below the epidermis is probably due to the inflammatory reaction which it excites rather than to any direct action on the bacteria.

Internal: Iodin is more irritating to mucous membranes than to the skin. It is seldom used internally because its action on the stomach and intestines may be sufficiently irritating to excite a suppurative gastritis, and in the intestines may cause diarrhea. Iodin is chiefly converted in the stomach and intestines into iodids and absorbed in this form. A certain amount of protein compound of iodin also is formed. After absorption iodin acts like the iodids (see **Potassium Iodid**).

Local Uses: In the diseases of the eye iodin is sometimes used as a caustic agent and germicide to corneal ulcers of the simple type. It should be applied by means of a pointed toothpick soaked in the solution and used very cautiously. For the treatment of chronic granular pharyngitis, in acute follicular tonsillitis, and in cases of middle ear catarrh associated with granular pharyngitis, it may be applied mixed with glycerin and combined with other remedies. The following formulas may be used:

℞ Tincturae iodi ..... 3 Cc.
Glycerini ..... 30 Cc.

℞ Tincturae iodi ..... 10 Cc.
Tincturae ferri chloridi ..... 10 Cc.
Glycerini ..... 10 Cc.

In gynecology the tincture is often applied directly to the interior of the cervix and painted over the mucous membrane of the vagina. This application is especially recommended in acute gonorrheal endocervicitis. Solutions of iodin have been much used in surgery. The tincture is often injected into cysts to cause the adhesion of their walls. Such applications should be made with caution. It is applied in a similar way to fistulous canals. A diluted solution is useful as a stimulant to ulcers. For the disinfection of wounds a 3 per cent. alcoholic solution of iodin should be applied to the skin about the wound; and to the wound itself, pieces of gauze soaked in the same solution.

Tinctura Iodi (Tr. Iodi), Tincture of Iodin, U. S. P.—One hundred Cc. contain 7 Gm. iodin and 5 Gm. potassium iodid dissolved in distilled water (5) and mixed with alcohol. This preparation, since it contains potassium iodid, is quite dissimilar to that formerly official in the U. S. P. or the international standard preparation generally prescribed in Europe. The present U. S. P. tincture of iodin has the advantage of being more stable so far as the iodin content is concerned and of being miscible with water.

Dosage: 0.1 Cc. or 1½ minims. (If iodin is mixed with milk, the greater part is converted into iodid and protein compounds, and larger doses are therefore tolerated.)

Ipecacuanha (Ipecac.), Ipecac, U. S. P. (Ipecacuanhae Radix, P. I.)—The dried root of *Cephaelis ipecacuanha,* commercially known, as Rio, Brazilian or Para ipecac, or of *C. acuminata,* commercially known as Cartagena ipecac. When assayed according to the method in the U. S. P., it should contain not less than 1.75 per cent. of the ether-soluble ipecac alkaloids.

Action and Uses: When given by mouth in rather large doses, ipecac causes nausea and vomiting, partly through its local irritant action. It is, however, neither a very rapidly acting nor a trustworthy emetic. Its use as such is almost entirely confined to pediatric practice. In smaller doses it is nauseant and is used to promote the secretions of the respiratory tract. Still smaller doses may act as stomachics through mild irritation of the gastric mucosa. When combined with opium, in the form of Dover's powder, ipecac is a diaphoretic. Both ipecac and one of its principal alkaloids, emetin, are considered specific against amebic dysentery. In the treatment of this disease large doses of ipecac are required and opium or some other depressant drug may be necessary to prevent the occurrence of vomiting. Emetin, in the form of the hydrochlorid can, however, be given hypodermically in doses which correspond to large amounts of the crude drug, without causing nausea or vomiting. (See **Emitinae Hydrochloridum.**)

Dosage: The expectorant dose of ipecac is 0.06 Gm. or 1 grain. As an emetic 1 Gm. or 15 grains may be given. For use in dysentery it may be given in salol-coated pills. The coating should not be too thick, lest too large a dose of salol be given. Ipecac may also be given, suspended in mucilage of acacia, by a duodenal catheter. In dysentery an initial dose of 2 Gm. or 30 grains may be given and vomiting should be prevented by a previous hypodermic injection of morphin.

Fluidextractum Ipecacuanhae (Fldext. Ipecac.), Fluidextract of Ipecac, U. S. P.—One hundred Cc. represent 100 Gm. ipecac, in approximately 75 per cent. alcohol, and yields not less than 1.8 Gm. of the ether-soluble alkaloids of ipecac.

Dosage: As an emetic, 1 Cc. or 15 minims; as an expectorant, 0.05 Cc. or 1 minim.

Syrupus Ipecacuanhae (Syr. Ipecac.), Syrup of Ipecac, U. S. P.—One hundred Cc. represent 7 Cc. fluidextract of ipecac; it is approximately seven times the strength of the international standard syrup of ipecac.

Dosage: As an expectorant, 1 Cc. or 15 minims given every two or three hours; as an emetic, 15 Cc. or 4 fluidrams. To a small child, 1 teaspoonful (4 Cc. or 1 fluidram) may be given every ten or fifteen minutes until vomiting occurs. Thus administered, it is an effective remedy in spasmodic croup.

Jalapa (Jalap.), Jalap, U. S. P.—The dried tuberous root of *Exogonium purga*. Frequently used in the form of powder. It yields not less than 7 per cent. of the total resins of jalap.

Action and Uses: Jalap is a powerful purgative, producing copious watery evacuations. It is used for the purpose of removing water from the tissues in the treatment of dropsy.

Dosage: 1 Gm. or 15 grains. It is best administered as:

Pulvis Jalapae Compositus (Pulv. Jalap. Co.), Compound Powder of Jalap, U. S. P. (Pulvis Purgans).—A mixture of jalap (35 Gm.) and potassium bitartrate (65 Gm.).

Dosage: 2 Gm. or 30 grains.

Linum, Linseed, U. S. P. (Flaxseed).—The ripe seed of *Linum usitatissimum*. Used extensively in the ground form for making cataplasms.

Oleum Lini (Ol. Lini), Linseed Oil, U. S. P. (Oil of Flaxseed, Raw Linseed Oil).—A fixed oil, obtained from linseed. Linseed oil which has been "boiled" must not be used in medicine.

PROPERTIES: Linseed oil occurs as a yellowish, oily liquid, having a peculiar odor and a bland taste. It is slightly soluble in absolute alcohol, but practically insoluble in water.

ACTION AND USES: Linseed oil has the properties of other bland oils, but is seldom administered internally. For pharmaceutical purposes it is used in the making of lime liniment, and of soft soap.

DOSAGE: 30 Cc. or 1 fluidounce.

Luminal, Luminal, N. N. R. (Phenobarbital, Phenyl-Ethyl-Barbituric Acid, Phenyl-Ethyl-Malonyl, Urea).—2, 4, 6-trioxy-5-phenyl-ethyl pyrimidin. Luminal (phenobarbital) differs from barbital in that one ethyl group (C_2H_5) has been replaced by one phenyl group (C_6H_5).

PROPERTIES: Luminal is a white, odorless, slightly bitter powder. It is almost insoluble in cold water, slightly soluble in hot water; it is soluble in alcohol, ether and chloroform, and in alkaline solutions.

ACTION AND USES: Luminal (phenobarbital), like barbital, is a hypnotic and sedative. Luminal has a sedative action on respiration, lessening the frequency of breathing. It kills by respiratory paralysis. It is eliminated by the kidneys, a certain portion being probably decomposed in the organism. No gastric disturbances have been observed.

Luminal is used as a hypnotic in nervous insomnia and conditions of excitement of the nervous system. It is also used as a sedative and antispasmodic in the treatment of epilepsy—the condition in which it finds its chief field of usefulness. Luminal is used in a variety of conditions of a chronic character as a palliative measure, but it is well to bear in mind that its actions are purely palliative and never curative.

DOSAGE: From 0.015 to 0.3 Gm. or ¼ to 5 grains, increased if necessary to 0.8 Gm. or 12 grains. The average dose is 0.1 Gm. or 1½ grains. A maximum dose of 0.8 Gm. or 12 grains should not be exceeded.

Magnesii Carbonas (Mag. Carb.), Magnesium Carbonate, U. S. P.—A mixture of hydrated magnesium carbonate and magnesium hydroxid, corresponding to not less than 39.2 per cent. of MgO.

PROPERTIES: Magnesium carbonate occurs as light, white, friable masses, or a bulky, white powder, without odor, and having a slightly earthy taste. It is practically insoluble in water and in alcohol, but soluble with effervescence in dilute acids.

INCOMPATIBILITIES: It is incompatible with acids, which form salts of magnesium.

ACTION AND USES: Magnesium carbonate when taken internally neutralizes the acid in the stomach. It may be used in cases of hyperacidity or acid gastritis, but it is sometimes objectionable on account of the carbon dioxid gas evolved, magnesium oxid being generally preferred for

this reason. The salt formed is laxative. If magnesium carbonate passes the stomach without neutralization, it may escape solution in the intestines and not act as a laxative. Large doses sometimes produce an accumulation of the insoluble carbonate and may lead to intestinal obstruction. Magnesium carbonate is also used as a dusting powder in intertrigo and in similar conditions, and as a cosmetic.

DOSAGE: 3 Gm. or 45 grains.

Magnesii Citras, Magnesium Citrate.—Used in medicine as:

LIQUOR MAGNESII CITRATIS (LIQ. MAG. CIT.), SOLUTION OF MAGNESIUM CITRATE, U. S. P.—A solution containing 10 per cent. of a mixture of neutral and acid magnesium citrate corresponding to not less than 1.5 per cent. of MgO.

The materials for making 360 Cc. or 12 ounces of the preparation are placed in a strong bottle, potassium bicarbonate being added last, and the bottle properly corked.

ACTION AND USES: Solution of magnesium citrate is an agreeable form of administering saline purgative.

DOSAGE: The average dose is one bottle containing 360 Cc. or 12 fluidounces, often given in divided doses.

Magnesii Oxidum (Mag. Oxid.), Magnesium Oxid, U. S. P. (Magnesia, Calcined Magnesia, Light Magnesia).—Contains, after ignition, not less than 96 per cent. of MgO.

PROPERTIES: Magnesium oxid is a white, very bulky and very fine powder, without odor, and having an earthy but not a saline taste. It is almost insoluble in water and alcohol, but dissolves very readily in acids, forming salts of magnesium.

ACTION AND USES: Magnesium oxid is used mostly as an antacid to neutralize excessive acidity in the gastric juice. It is especially suitable for cases of hyperacidity accompanied by constipation. It is preferable in most cases to the carbonates or bicarbonates because it yields no gas on being neutralized, although in the treatment of constipation it may be usefully mixed with these. It is sometimes given in diarrhea with excessive acidity in children. It is an efficient antidote to the corrosive acids.

DOSAGE: From 0.6 to 3 Gm. or from 10 to 45 grains.

Magnesii Sulphas (Mag. Sulph.), Magnesium Sulphate, U. S. P. (Epsom Salt).—Contains not less than 99.5 per cent. of $MgSO_4+7H_2O$.

PROPERTIES: Magnesium sulphate occurs as small, colorless prismatic needles or rhombic prisms, without odor, and having a cooling, saline and bitter taste. It is freely soluble in water (1:1), but practically insoluble in alcohol.

ACTION AND USES: Magnesium sulphate is one of the most active of the saline cathartics. A considerable part

remains unabsorbed in the intestines, where it also retains fluid, and thus liquefies the stools. Whatever portion is absorbed acts as diuretic. It is thus a useful adjuvant in the removal of dropsies, especially in heart disease. The rate of absorption of magnesium sulphate from the alimentary canal is too slow to produce systemic effects; but if magnesium sulphate is injected intravenously or intramuscularly, it depresses the muscles and the central and peripheral nervous systems. Lumbar subdural injection produces spinal anesthesia, but is not advisable in man, except in connection with tetanus. In tetanus, magnesium sulphate abolishes the convulsions temporarily and thus spares the patient; but it does not dispense with the need of antitoxin treatment. It is used intramuscularly (0.6 Cc. of a 25 per cent. solution of crystalline magnesium sulphate per kilogram of body weight, six times daily); or, in severe cases, by spinal injection (0.1 Cc. of a 25 per cent. solution per kilogram, repeated daily if necessary). Effective doses of magnesium sulphate may arrest respiration; this is successfully combated by artificial respiration together with physostigmin salicylate (½ to 1 mg. given hypodermically) or calcium chlorid (50 Cc. of 2 per cent. given hypodermically or 600 Cc. of 0.02 per cent. in normal saline solution intravenously). The physician must be prepared to adopt these measures with the first signs of respiratory failure. Concentrated solutions of magnesium sulphate have been widely used as local applications in various inflammations, such as sprains, burns, erysipelas and the like, with asserted beneficial results.

Dosage: 15 Gm. or 4 drams. Magnesium sulphate may be dissolved so that 2 Cc. of the solution contains 1 Gm. of the salt, and of this solution 5 Cc., properly diluted, are given hourly until evacuation is secured.

Mentha Piperita (Menth. Pip.), Peppermint, U. S. P.—The dried leaves and flowering tops of *Mentha piperita.*

Oleum Menthae Piperitae (Ol. Menth. Pip.), Oil of Peppermint, U. S. P.—A volatile oil distilled from the flowering plant of *Mentha piperita.*

Properties: Oil of peppermint occurs as a colorless liquid, with the characteristic peppermint odor and a strongly aromatic, pungent taste, followed by a sensation of cold when air is drawn into the mouth.

Action and Uses: Oil of peppermint is used as a stimulant, carminative and reflex.

Dosages 0.2 Cc. or 3 minims. It is administered chiefly in form of:

Spiritus Menthae Piperitae (Sp. Menth.), Spirit of Peppermint, U. S. P. (Essence of Peppermint).—One hundred Cc. contains 10 Cc. oil of peppermint in alcohol, colored with the chlorophyl extracted from peppermint.

ACTION AND USES: See the oil.

DOSAGE: 2 Cc. or 30 minims, taken in water or on a lump of sugar.

AQUA MENTHAE PIPERITAE (AQ. MENTH. PIP.), PEPPERMINT WATER, U. S. P.—A saturated solution of oil of peppermint in distilled water.

ACTION AND USES: Peppermint water is used as a flavoring vehicle.

DOSAGE: 15 Cc. or 4 fluidrams.

Menthol, Menthol, U. S. P.—A secondary alcohol, $C_{10}H_{19}OH$, obtained from oil of peppermint or other mint oils.

PROPERTIES: Menthol occurs as colorless, acicular or prismatic crystals, having a strong and pure odor of peppermint and a warm, aromatic taste, followed by a sensation of cold when air is drawn into the mouth. It is only slightly soluble in water, but freely soluble in alcohol, ether, liquid petrolatum, etc.

ACTION AND USES: Solid menthol is used in the form of "menthol pencils" as a cooling counterirritant, especially in neuralgia or headache, being frequently rubbed over the painful area. As an antipruritic, it is applied as a 1 to 2 per cent. ointment or oily solution. As an antiseptic and stimulant for inflamed mucous membranes, especially in the nose and throat, menthol is used as 1 per cent. solution in liquid petrolatum. The inhalation of menthol vapor gives considerable relief in acute rhinitis. Internally, menthol is sometimes employed for the relief of gastric pains.

DOSAGE: 0.06 Gm. or 1 grain.

Methylis Salicylas (Methyl. Salicyl.), Methyl Salicylate, U. S. P. (Oleum Gaultheriae, U. S. P. VIII, Oil of Wintergreen, Oleum Betulae, U. S. P. VIII, Oil of Sweet Birch, Oil of Teaberry).—An ester, $CH_3C_7H_5O_3$, occurring in oil of birch and in oil of wintergreen, and also produced synthetically.

PROPERTIES: Pure methyl salicylate is a colorless liquid, having a characteristic, strongly aromatic, wintergreen odor and a sweetish, warm and aromatic taste. It is nearly insoluble in water, but miscible in all proportions with alcohol. The oils obtained from natural sources frequently have a pinkish tint, because of the contamination with traces of iron, but in general have the same properties as methyl salicylate, to the requirements and tests for which they conform.

ACTION AND USES: Methyl salicylate is antiseptic. When rubbed on the skin it is absorbed, producing irritation at the same time. When thus absorbed, or when taken internally, it produces the effects of salicylic acid or the salicylates (see **Sodium Salicylate**). For the relief of pain in local rheumatic swellings and neuritis, it is frequently applied as counterirritant as well as for its action after absorption.

DOSAGE: 1 Cc. or 15 minims. When given internally this substance is administered preferably in the form of capsules, care being taken that the stomach is not empty and that plenty of water is taken. It has the disadvantage, however, of being more irritant to the stomach than sodium salicylates. Locally, the oil may be applied pure or added to liniments.

Mistura Toxici Diphtheritici et Antitoxici Diphtheritici, Diphtheria Toxin-Antitoxin Mixture, N. N. R.—A fluid containing both the diphtheria toxin and antitoxin; the toxin is partially neutralized by the presence of sufficient antitoxin.

PROPERTIES: The requirements of the U. S. Public Health Service for diphtheria toxin-antitoxin mixture are that it shall be sterile and labeled to show the volume of each human dose and the number of L+ doses (not more than three) of toxin contained in each human dose. The toxin must be so neutralized with antitoxin that five human doses shall cause death in not more than four out of five guinea-pigs, weighing 250 to 350 grams, in not less than four days after subcutaneous injection. Surviving pigs must die of diphtheritic paralysis in from fifteen to twenty-five days. One human dose shall not cause acute death, but 50 per cent. may die of diphtheritic paralysis.

ACTION AND USES: A more durable immunity against diphtheria is established by the use of a mixture of diphtheria toxin and diphtheria antitoxin than by the latter alone. The immunity does not appear until a considerable period of time has elapsed, and for this reason the mixture is not applicable in the presence of an outbreak of the disease, in which case it is better to use an immunizing dose of antitoxin alone. The toxin-antitoxin mixture finds its greatest field of usefulness in the immunization of young children; adults and older children need be immunized when they react positively to the diphtheria immunity test (Schick test).

DOSAGE: One Cc. subcutaneously, usually over the insertion of the deltoid muscle, at intervals of seven days for three doses. Very young children may receive 0.5 Cc. for the first dose, and 1 Cc. each for the second and third doses. The individual dose in terms of partly neutralized toxin varies from 1/10 L+ dose to 3 L+ doses; at the present time the tendency is to use smaller doses than has been the custom in the past.

Morphinae Hydrochloridum (Morph. Hydrochl.), Morphin Hydrochlorid, U. S. P. (Morphin Chlorid).—The hydrochlorid, $C_{17}H_{19}O_3N.HCl+3H_2O$, of the alkaloid morphin.

PROPERTIES: Morphin hydrochlorid occurs as white crystals or as a crystalline powder, odorless and having a bitter taste. It is soluble in water (1: 17.5), and in alcohol (1: 52).

ACTIONS AND USES: See Morphinae Sulphas.

DOSAGE: 0.008 Gm. or ⅛ grain.

Morphinae Sulphas (Morph. Sulph.), Morphin Sulphate, U. S. P.—The sulphate, $(C_{17}H_{19}O_3N)_2H_2SO_4+5H_2O$, of the alkaloid morphin.

PROPERTIES: Morphin sulphate occurs as white, feathery crystals or in cubical masses, odorless, permanent in the air and having a bitter taste. It is soluble in water (1: 15.5), but only slightly soluble in alcohol (1: 565).

INCOMPATIBILITIES: Solutions of salts of morphin are incompatible with alkalies, tannic acid, iodids and other precipitants of alkaloids.

ACTION AND USES: Morphin produces a specific central analgesic action; a depressant effect on the respiratory and associated medullary centers; a descending depressant action on the entire central nervous system; and a constipating effect resulting from a combination of central and local actions. Morphin is practically devoid of local action, except on the gastro-intestinal tract. This local action is the subject of much debate, but it seems certain that it plays a part in the causation of the constipation which results from the administration of the drug. The systemic actions of morphin are greatly dependent on the dose used. The smallest doses producing therapeutic effects result in the relief of pain; somewhat larger doses cause definite cerebral depression leading to more or less profound and prolonged sleep. Some persons react peculiarly to morphin, showing one or more of the following symptoms: cerebral excitation, more common, perhaps, in women than in men, but usually mild and of short duration, soon giving place to the depressant action of the drug; nausea, and even vomiting, which not infrequently result from the systemic administration of a small dose. In some persons nausea is a very pronounced after-effect of the drug, lasting, at times, for hours. The drug probably exerts a decided effect on the heart, through the vagus mechanism, chiefly influencing the rhythm, which may become irregular. The rate may be slowed considerably after large doses, but morphin does not endanger life through its cardiac action. Morphin causes a marked constriction of the pupil when given in moderate doses, and this phenomenon is often used as a gage for the cessation of its administration in cases in which large doses are necessary. It has no local miotic action when dropped into the eyes. The respiratory center is depressed by relatively small doses of morphin—such as are too small to be hypnotic. Use is made of this action in the treatment of persistent and troublesome cough, but it should be remembered that if the cough is "productive," the depression of the cough reflex may lead to a dangerous retention of the secretions of the inflamed mucosa. Morphin may be used to relieve the attacks of asthma and to lessen dyspnea from other causes, but caution should be exercised that the slowing of the respiration does not embarrass the heart. Usually it is better to treat the cause of the dyspnea, and asthmatic attacks are better relieved by epinephrin. It should be used cautiously in the pain and dyspnea of uremia, as it interferes with elimina-

tion by the intestines. Morphin is used chiefly as an analgesic in conditions of severe acute pain, but even here its use should be very guarded for various reasons, but chiefly on account of the great danger of the formation of the morphin habit. In surgical conditions in which the alleviation of severe pain may obscure the course of the disease and lead to the unwarranted postponement of an operation, morphin should not be used, or only in very small doses and with circumspection. In chronic conditions associated with pain, morphin should not be used, as the formation of the habit is almost certain to result from its prolonged administration. Exceptions to this generalization are to be found in such conditions as inoperable cancer, etc., in which the condition is hopeless and at the same time the cause of much suffering. Morphin should not be used for the relief of pain in persons of a neurotic or hysteric temperament, unless absolutely unavoidable. In general, it may be said that morphin should not be used for the relief of pain when any satisfactory relief can be obtained by the use of other remedies. Since the introduction of the coal-tar analgesics and of the hypnotics of the chloral group, the use of morphin as a pure hypnotic has become exceptional, but it is the only drug that has the power of inducing sleep in sleeplessness due to violent pain or dyspnea.

Habituation to morphin is readily established, and this habit is one of the most difficult to break. Heroin (di-acetyl-morphin) is even more dangerous. Too great discrimination in its use can scarcely be urged. Prescriptions for morphin or heroin must conform to the provisions of the Harrison Narcotic Law. (See footnote under Cocainae Hydrochloridum.) Overdoses of morphin lead to intoxication which may result fatally. The symptoms begin with the usual depression which deepens into sleep. The pupils become extremely constricted. Respiration becomes slow; the sleep deepens into coma from which the patient can be aroused with difficulty at first; later he cannot be aroused at all, and the respiration sinks to as low as three or four per minute. The heart is somewhat weakened and its rate is slowed. Death results from respiratory failure. The treatment of morphin poisoning is not germane to this work, but its proper execution will often save a patient who is deemed hopeless. Morphin is excreted largely through the alimentary tract, including the stomach. Some of the morphin thus excreted may be reabsorbed into the circulation; hence, in cases of poisoning, the use of frequent gastric lavage with potassium permanganate 1:2000, to destroy the morphin, is an important measure. Even after the hypodermic administration of the drug it is excreted by way of the gastro-intestinal tract. Morphin is also used to lessen secretion and check peristalsis in diarrhea. For this purpose opium appears to be more efficient than morphin.

Dosage: 0.008 Gm. or ⅛ grain. Smaller doses, from 0.005 to 0.006 Gm., or ½ to ⅙ grain, are often sufficient.

Myrrha (Myrrh.), Myrrh, U. S. P. (Gum Myrrh).—A gum resin obtained from one or more species of *Commiphora*.

ACTION AND USES: It is used as a carminative, especially in connection with aloes, in the form of pills.

DOSAGE: 0.5 Gm. or 8 grains.

TINCTURA MYRRHAE (TR. MYRRH.), TINCTURE OF MYRRH, U. S. P.—One hundred Cc. represent 20 Gm. myrrh in alcohol.

ACTION AND USES: Tincture of myrrh is used chiefly as an astringent in mouth washes and gargles for relaxed throat and spongy gums.

DOSAGE: 1 Cc. or 15 minims. For use in the mouth dilute with an equal volume of water.

Neocinchophen, Neocinchophen, N. N. R. (Ethyl-6-methyl-2-phenyl-quinolin-4-carboxylate.—The ethyl ester of methyl-phenyl-quinolin-carboxylic acid (cinchophen), $CH_3.C_9H_4.N.C_6H_5COOC_2H_5$, 6:2:4. Neocinchophen was first introduced as novatophan.

PROPERTIES: Neocinchophen is a pale yellow powder, odorless and tasteless; permanent in the air. It is nearly insoluble in water and in dilute alkalis.

ACTION AND USES: The same as those of cinchophen. It has the advantage over cinchophen in that it is almost devoid of taste and is less prone to produce gastric disturbance.

DOSAGE: The same as that of cinchophen.

Nitrogenii Monoxidum (Nitrogen. Monox.), Nitrogen Monoxid, U. S. P.—Nitrous Oxid, N_2O.

PROPERTIES: Nitrogen monoxid is a colorless gas, possessing a slight, characteristic odor and a somewhat sweet taste. It is quite soluble in water at low temperatures. Nitrogen monoxid is readily liquified by pressure.

ACTION AND USES: Nitrogen monoxid causes anesthesia by direct influence on the central nervous system, as well as by the production of asphyxia. After a few deep inspirations, the face assumes a deathly pallor and the patient becomes unconscious. Nitrogen monoxid and oxygen are most frequently used as a means of producing anesthesia for brief operations and in obstetrics. The combination is also used preliminary to the induction of anesthesia with ether or chloroform.

DOSAGE: Nitrogen monoxid is supplied in the compressed, liquid state in steel cylinders. For use the liquid is allowed to assume the gaseous state by decreasing the pressure and the gas is inhaled by the patient from an inhalation apparatus.

Nux Vomica (Nux. Vom.), Nux Vomica, U. S. P. (Strychni Semen, P. I.).—The dried, ripe seed of *Strychnos nux-vomica,* yielding, when assayed by the process given in the U. S. P., not less than 2.5 per cent. of the alkaloids of nux vomica, of which about one-half is strychnin.

ACTION AND USES: The pharmacologic action of nux vomica is essentially the same as that of the strychnin which it contains. The preparations of nux vomica are used as stomachic tonics, and occasionally as respiratory and nerve stimulants. For the latter purpose the salts of strychnin are generally preferred. (See **Strychninae Sulphas.**)

EXTRACTUM NUCIS VOMICAE (EXT. NUC. VOM.), EXTRACT OF NUX VOMICA, U. S. P. (Powdered Extract of Nux Vomica, Nucis Vomicae Extractum, P. I.).—A powdered extract of nux vomica made by extracting the drug with a mixture of alcohol and water, yielding, when assayed by the process given in the U. S. P., from 15.2 to 16.8 per cent. of the alkaloids of nux vomica.

DOSAGE: 0.015 Gm. or ¼ grain, preferably given in the form of pills; 0.020 Gm. or ⅓ grain contains about 0.001 Gm. or 1/60 grain of strychnin.

TINCTURA NUCIS VOMICAE (TR. NUC. VOM.), TINCTURE OF NUX VOMICA, U. S. P.—One hundred Cc. represent 10 Gm. of nux vomica in a mixture of alcohol and water; it should assay about 0.25 Gm. of total alkaloids of nux vomica in 100 Cc.

DOSAGE: 0.5 Cc. or 8 minims.

When the tincture is used as an appetizer, its effect depends largely on the psychic stimulation produced by the bitter taste, and the dose may vary from 0.05 Cc. to 0.6 Cc. or from 1 to 10 minims. Compound tincture of gentian is a vehicle for it. If it is desired to obtain the effect of strychnin, it is to be remembered that 0.6 Cc. or 10 minims contain approximately 0.6 mg. or 1/100 grain of strychnin.

Oleum Chaulmoograe, Chaulmoogra Oil, N. N. R.—A fixed oil obtained by expression from the ripe seeds of *Taraktogenos kuruzi.*

PROPERTIES: Chaulmoogra oil is a yellow, or brownish yellow liquid, or, at a temperature below 25 C., a whitish, soft solid. It has a characteristic odor and a somewhat acrid taste. It is slightly soluble in alcohol; soluble in benzene, chloroform, ether and petroleum benzin.

ACTION AND USES: The therapeutic properties of chaulmoogra oil appear to be due to optically active, unsaturated fatty acids, chiefly chaulmoogric acid and hydnocarpic acid, which occur in the oil in the form of glycerids. These fatty acids, chiefly chaulmoogric acid and hydnocarpic acid, such as the bacillus of leprosy and it is to this property that the beneficial effects of chaulmoogra oil in leprosy are probably due.

Chaulmoogra oil has been used in the treatment of leprosy for many years. The bulk of the evidence indicates that it is of high value, though not having specific, curative properties.

Dosage: 0.3 Cc. or 5 minims in capsules thrice daily, increasing the dose to the point of tolerance. For intramuscular injection, 1 to 5 Cc. or 15 to 75 minims, mixed with a fatty oil, once a week. The following mixture has been used: chaulmoogra oil 50 Cc., olive oil 50 Cc., camphor 0.5 Gm., Guaiacol 1 Gm.

Chaulmestrol, Chaulmestrol, N. N. R.—The ethyl esters of the fatty acids of chaulmoogra oil.

Properties: Chaulmestrol is a limpid, almost colorless oily liquid, neutral in reaction, having a faint odor and not unpleasant taste. It is insoluble in water, but miscible in all proportions with alcohol and ether.

Action and Uses: The same as those of Oleum Chaulmoogra. It is claimed to be better tolerated than chaulmoogra oil and its injection is claimed to be less liable to produce abscesses.

Dosage: 1 to 5 Cc. or 15 to 75 minims daily after meals in warm milk or hot tea, administered in gradually increasing doses. Intramuscularly, 1 Cc. or 15 minims is the initial dose, this being increased by 1 Cc. or 15 minims every second or third injection until a maximum of 3 to 5 Cc. or 45 to 75 minims is reached. The injections are administered once a week.

Oleum Morrhuae (Ol. Morrh.), Cod-Liver Oil, U. S. P. (Oleum Jecoris Aselli).—A fixed oil obtained from the fresh livers of *Gadus morrhua.*

Properties: Cod-liver oil occurs as a pale yellow, thin, oily liquid, having a peculiar, slightly fishy, but not rancid odor, and a bland, fishy taste.

Action and Uses: Cod-liver oil is a nutrient, useful in certain conditions of nutritive deficiency. It deserves a place in therapeutics because it is readily digestible and assimilable, and also because of its definitely favorable influence in rickets. It is more palatable when administered in the form of a recently prepared emulsion, a formula for which is official (Emulsion Olei Morrhuae, 50 per cent.; average dose, 15 Cc.). Alcoholic preparations of the so-called active principles of cod-liver oil have no demonstrable therapeutic action.

Dosage: 4 to 30 Cc., or 1 fluidram to 1 fluidounce, taken 3 times daily, preferably two hours after meals.

Oleum Ricini (Ol. Ricin.), Castor Oil, U. S. P. (Oleum Ricini).—A fixed oil expressed from the seed of *Ricinus communis.*

PROPERTIES: Castor oil occurs as a pale yellowish or almost colorless viscid liquid, having a faint, mild odor and a bland, afterward slightly acrid and generally offensive taste. It is practically insoluble in water, but freely soluble in alcohol (1: 1).

ACTION AND USES: Castor oil is used as a profuse cathartic mildly irritating both the small and the large intestine. Locally, particularly in the eye, it is sometimes employed as a demulcent.

DOSAGE: 15 Cc. or 4 fluidrams.

Castor oil may be administered to adults in form of elastic capsules (up to 5 Cc. in each), or floating between a heavy syrup and an alcoholic flavoring liquid, or in the foam of "soda water." To children it may be given in the form of emulsion, Emulsum Olei Ricini, N. F., a 35 per cent. emulsion.

Oleum Santali (Ol. Santal.), Oil of Santal, U. S. P. (Sandalwood Oil, Oil of Sandalwood).—A volatile oil distilled from the wood of *Santalum album*.

PROPERTIES: Oil of santal occurs as a pale yellow, somewhat thick liquid, having the characteristic odor of sandalwood, and a pungent, spicy taste. It is readily soluble in alcohol, but practically insoluble in water.

ACTION AND USES: Oil of santal is a local and excretory irritant, credited with an antiseptic effect in the urine, exerted especially against the gonococcus. It is used extensively in the treatment of gonorrhea, but is not suitable to the acute stages of this disease on account of the possibility of its increasing the irritation. Its use should be confined to the subacute and chronic stages, in which its irritant action may stimulate healing. It may produce gastric or renal irritation, and skin eruptions.

DOSAGE: 0.5 Cc. or 8 minims, or more, if well tolerated, preferably given in capsules (0.3 Cc. or 5 minims in each), 3 times daily after meals.

Oleum Theobromatis (Ol. Theobrom.), Oil of Theobroma, U. S. P. (Butter of Cacao, Cacao Butter).—A fixed oil expressed from the roasted seeds of *Theobroma cacao*.

PROPERTIES: Oil of theobroma occurs as a yellowish-white solid, having a faint, agreeable odor and a bland, chocolate-like taste. It is freely soluble in ether, chloroform and benzene, soluble in absolute alcohol and insoluble in water.

ACTION AND USES: Oil of theobroma is used in pharmacy chiefly for the making of suppositories; also as a lubricant in massage, and as an application to sore nipples.

Oleum Tiglii (Ol. Tiglii), Croton Oil, U. S. P. (Oleum Tiglii).—A fixed oil expressed from the seed of *Croton tiglium*.

PROPERTIES: Croton oil occurs as a pale yellow or brownish-yellow somewhat viscid, and slightly fluorescent liquid, having a slight, fatty odor, and a mild, oily, afterward acrid and burning, taste. It is practically insoluble in water, slightly soluble in alcohol.

Action and Uses: Croton oil is a drastic cathartic, producing violent irritation of the digestive canal. It is used, but rarely, to secure prompt evacuation of the intestines, especially in coma. When applied to the skin, it causes rubefaction, vesication, pustulation and ulceration. These effects develop slowly and are not readily controlled, so that its use is not advisable.

Dosage: 0.05 Cc. or 1 minim, given in olive oil, butter, etc. It may be placed on the tongue in granulated sugar if the patient cannot swallow.

Opium, Opium, U. S. P.—The air-dried milky exudation obtained by incising the unripe capsules of *Papaver somniferum* and its variety *album*.

Action and Uses: The action of opium closely resembles that of morphin. Opium, however, is absorbed more slowly. It has also been shown that some of the other opium alkaloids modify the action. Papaverin, N. N. R., for instance, has a relaxing action on involuntary musculature. Thus opium is more constipating than morphin, and hence preferred for the purpose of checking diarrhea.

Prescriptions for opium and its preparations must conform to the provisions of the Harrison Narcotic Law. See footnote under **Cocainae Hydrochloridum.**

Opii Pulvis (Opii Pulv.), Powdered Opium, U. S. P. (Opii Pulvis, P. I.).—Yielding, when assayed by the official process, not less than 10 per cent. of anhydrous morphin.

Dosage: 0.06 Gm. or 1 grain, containing about 0.006 Gm. or about $\frac{1}{10}$ grain of morphin. Suppositories of opium have no advantage on account of local action.

Tinctura Opii (Tr. Opii), Tincture of Opium, U. S. P. (Laudanum, Opii Tinctura, P. I.).—A solution of the soluble constituents of opium in diluted alcohol. One hundred Cc. contain about 1 Gm. of anhydrous morphin.

Dosage: 0.5 Cc. or 8 minims.

Tinctura Opii Deodorati (Tr. Opii Deod.), Tincture of Deodorized Opium, U. S. P.—Essentially a tincture of opium that has been deodorized by means of purified petroleum benzin.

Dosage: 0.5 Cc. or 8 minims.

Tinctura Opii Camphorata (Tr. Opii Camph.), Camphorated Tincture of Opium, U. S. P. (Paregoric, Opii Tinctura Benzoica, P. I.).—Each 100 Cc. represent powdered opium (0.4 Gm.), benzoic acid (0.4 Gm.), camphor (0.4 Gm.), oil of anise (0.4 Cc.), glycerol (4 Cc.), and diluted alcohol (to make 100 Cc.).

Dosage: 4 Cc. or 1 fluidram, containing 0.0016 Gm. or ¼₀ grain of morphin.

Pulvis Ipecacuanhae et Opii (Pulv. Ipecac. et Opii), Powder of Ipecac and Opium, U. S. P. (Compound Powder of Ipecac, Dover's Powder, Opii et Ipecacuanhae Pulvis Compositus, P. I.).—A mixture of ipecac (10 Gm.), powdered opium (10 Gm.) and sugar of milk (80 Gm.).

Action and Uses: Dover's powder is used chiefly for diaphoretic and analgesic effect in "breaking up a cold."

Dosage: 0.5 Gm. or 8 grains, containing 0.005 Gm. or ¹/₁₂ grain of morphin.

Oxygenium (Oxygen.), Oxygen, U. S. P.—Gaseous oxygen, O_2, in a compressed state. Contains not less than 95 per cent. of O.

Properties: Oxygen occurs as a colorless, odorless and tasteless gas, slightly soluble in water and neutral to ordinary indicators. This gas is not inflammable, but supports combustion much more vigorously than does air.

Action and Uses: Compressed oxygen is administered for the purpose of relieving difficult respiration in cases of mechanical hindrance to the ingress of air to the lungs; and in the treatment of carbon monoxid poisoning. It is also mixed with nitrogen monoxid when this gas is used as an anesthetic.

Pancreatinum (Pancreat.), Pancreatin, U. S. P.—A mixture containing enzymes existing in the pancreas of warm-blooded animals, usually obtained from the fresh pancreas of the hog, *Sus scrofa* or the ox, *Bos taurus*.

Properties: Pancreatin occurs as a cream-colored, amorphous powder, having a faint, peculiar, not unpleasant odor, and a somewhat meat-like taste. It is partially soluble in water and should not contain more than 10 per cent. of insoluble matter. It is practically insoluble in alcohol. Commercial samples commonly contain no steapsin, and other ferments may be present in traces only.

Action and Uses: Pancreatin is used chiefly for the predigestion of milk and other foods. Since it is destroyed by the action of the gastric juice, its use for the digestion of food in the stomach is illogical, if the stomach contains any acid. In cases of achylia gastrica in which no hydrochloric acid is secreted, it may be given to secure the digestion of the food in the stomach. In such cases it is well to administer a small amount of an alkali, such as sodium bicarbonate, in order to neutralize any acidity that may be present. The attempt is sometimes made to further the digestion of protein in the intestines by the administration of pancreatin in pills or capsules coated so as to prevent the action of the gastric juice. The drug may be

used in this manner in cases in which it is believed that the secretion of the pancreas is lacking or deficient, but this method is not usually very successful.

DOSAGE: 0.5 Gm. or 8 grains. Pancreatin may be administered internally in the form of salol-coated pills or in gelatin capsules that have been treated with formaldehyd.

Paraffinum (Paraff.), Paraffin, U. S. P.—A purified mixture of solid hydrocarbons, obtained by chilling and pressing the higher distillates from petroleum and purifying the solid press-cake so obtained.

PROPERTIES: Paraffin is a colorless or white translucent mass, without odor or taste and slightly greasy to the touch. It is practically insoluble in water or in alcohol.

ACTION AND USES: Paraffin is used as a protective covering for burns. For this purpose a plastic variety ("Paraffin for Films," N. N. R.) is melted and painted or sprayed on the dried surface and covered with dry dressing. Paraffin has been employed also in surgery for prosthetic purposes; its use for this purpose, however, is not without the danger of causing proliferation of surrounding tissue cells, leading to the development of a so-called "paraffinoma."

Paraldehydum (Paraldehyd.), Paraldehyd, U. S. P.—$(CH_3.CHO)_3$. A polymer of acetaldehyd, $CH_3.CHO$.

PROPERTIES: Paraldehyd is a colorless, transparent liquid, having a strong characteristic odor, and producing first a burning and then a cooling taste. It is soluble in water (1:8) and miscible in all proportions with alcohol.

ACTION AND USES: Paraldehyd is hypnotic and antispasmodic. It has no direct action on the circulation, except that it dilates the blood vessels. It acts rapidly and produces a sleep which closely resembles natural sleep. Its prompt, efficient action and low toxicity would make it a valuable hypnotic, were it not for its disagreeable odor. This persists in the breath of the patient and interferes with its use in many cases. It may cause a habit very similar to that induced by alcohol.

DOSAGE: 2 Cc. or 30 minims. Preferably administered with cracked ice or ice-water. Larger doses are employed in delirium tremens (a teaspoonful every hour, for several doses if necessary).

Pelletierinae Tannas (Pellet. Tann.), Pelletierin Tannate, U. S. P.—A mixture in varying proportions of the tannates of four alkaloids obtained from pomegranate bark.

PROPERTIES: Pelletierin tannate occurs as a light yellow, odorless, amorphous powder, having an astringent taste and a weak acid reaction. It is only slightly soluble in water (1:240), but soluble in alcohol (1:16).

Carbon tetrachloride better

ACTION AND USES: Pelletierin tannate is an effective anthelmintic and teniafuge.

DOSAGE: 0.25 Gm. or 4 grains. Preferably administered in the form of capsules. The alimentary canal should be emptied as completely as practicable by a mild purgative (castor oil or a saline). A light diet on the previous day and fasting on the morning on which the anthelmintic is given, should be prescribed. This remedy should be followed in two hours by a purgative (castor oil). Not more than 0.3 Gm. or 5 grains of pelletierin tannate should be given, as even this amount has produced paralysis. It may be given to children in syrup of citric acid, 0.1 Gm. (1½ grains) in 30 Cc. (1 fluidounce).

Pepsinum (Pepsin.), Pepsin, U. S. P.—A mixture containing a proteolytic ferment or enzyme obtained from the glandular layer of the fresh stomach of the hog, *Sus scrofa*.

PROPERTIES: Pepsin occurs as pale yellow, transparent or translucent scales or grains, or as a cream-colored, amorphous powder, free from offensive odor and having a slightly acid or saline taste. It is soluble, or almost entirely soluble in water (1: 50), the solution having more or less opalescence; it is practically insoluble in alcohol.

ACTION AND USES: Pepsin acts only in an acid medium. It is useful to secure the digestion of protein food in the stomach. It is seldom indicated, because the gastric juice usually contains sufficient pepsin to perform gastric digestion. It may be given in conjunction with hydrochloric acid in those cases of acute dyspepsia in which there is an absence of free hydrochloric acid in the stomach contents. In chronic cases it should be given only when the acid and pepsin are both lacking. As a rule, even when acid is absent, the pepsin is still secreted, and digestion will occur normally if hydrochloric acid is given without pepsin.

DOSAGE: 0.5 Gm. or 8 grains.

Petrolatum (Petrolat.), Petrolatum, U. S. P. (Petrolatum Ointment, Petroleum Jelly).—A purified mixture of hydrocarbons, obtained by distilling off the lighter and more volatile portions from petroleum, and purifying the residue.

PROPERTIES: Petrolatum occurs as an unctuous mass, of about the consistence of an ointment, varying in color from white to dark amber. The white variety is official as Petrolatum Album, or White Petrolatum, U. S. P.

ACTION AND USES: Petrolatum is used chiefly as a base for ointments. Sterilized petrolatum is employed as a lubricant.

Petrolatum Liquidum (Petrolat. Liq.), Liquid Petrolatum, U. S. P. (Liquid Paraffin, Mineral Oil).—A mixture of liquid hydrocarbons, obtained by distilling off most of

the lighter and more volatile portions from petroleum, and purifying the liquid residue. The specific gravity ranges from 0.828 to 0.905. In the Pharmacopeia two varieties are separately described as:

HEAVY LIQUID PETROLATUM.—Viscosity not less than 3.1.

LIGHT LIQUID PETROLATUM.—Viscosity not more than 3. Adapted for use in atomizers.

PROPERTIES: It occurs as a colorless or very slightly yellowish, oily, transparent liquid, without odor or taste, but giving off, when heated, a faint odor of petroleum. It is practically insoluble in water and only slightly more soluble in alcohol.

ACTION AND USES: Liquid petrolatum is used as a vehicle for medicinal agent for local application. When employed as a spray, the light liquid petrolatum should be used. It is also given internally, largely for its mechanical action, to keep the stools soft in the treatment of constipation. It is not absorbed by the intestine and has no nutritive properties. Liquid petrolatum should not be used as a vehicle for substances to be injected intramuscularly or subcutaneously, as it may lead to tumor formation.

DOSAGE: 15 Cc. or 4 fluidrams. It is best given at bedtime, or on an empty stomach in the morning; and, if necessary, before other meals as well.

Phenol, Phenol, U. S. P. (Acidum Carbolicum, Carbolic Acid).—Hydroxybenzene, C_6H_5OH, obtained from coal-tar by fractional distillation and subsequent purification or made synthetically.

PROPERTIES: Phenol should contain not less than 97 per cent. of C_6H_5OH. It occurs as colorless, interlaced or separate, needle-shaped crystals, having a characteristic, somewhat aromatic odor. When copiously diluted with water, it has a sweetish taste, with a slightly burning aftertaste, and, when undiluted, cauterizes and whitens the skin and mucous membranes. Phenol is soluble in water (1: 15) and miscible with alcohol in all proportions.

ACTION AND USES: Phenol is antiseptic and germicidal. A solution of 1:850 will prevent the multiplication of bacteria. A 1 per cent. solution will usually destroy non-sporulating bacteria in a few minutes at ordinary temperature, but a 5 per cent. solution fails to destroy anthrax spores after twenty-four hours' exposure. Phenol is taken as the type or standard for comparing the activity of disinfectants. The "Phenol Coefficient" means the relative strength of a disinfectant, as compared with a solution of phenol acting on the same organism and for the same length of time. It should be remembered that different micro-organisms show wide differences in their behavior toward antiseptics. Phenol is escharotic when applied to the skin, turning the skin and tissues white. If a finger or other extremity is surrounded with dressings wet even with a dilute solution of phenol, gangrene is likely to occur.

Phenol acts as a local anesthetic. In consequence of this property it is employed to relieve itching. It may be used in the strength of 1 per cent. in solution or in ointment. Phenol has been used as an antiseptic in mouth washes, gargles and sprays. It was formerly employed as an antiseptic in fermentation in the stomach, but it is of no value for this purpose. It is sometimes given to check vomiting. The injection of phenol into the rectum for the destruction of parasites is dangerous and has sometimes resulted fatally. Superficial "burns" from the action of phenol should be treated by the application of alcohol, glycerin, ether or oils to remove the poison. In phenol poisoning the stomach may be washed out by diluted alcohol, which should be completely removed by washing with water. If left in the stomach, the alcohol may favor the absorption of phenol.

Phenol Liquefactum (Phenol. Liq.), Liquefied Phenol, U. S. P. (Liquefied Carbolic Acid).—A liquid containing not less than 87 per cent., by weight, of C_6H_5OH.

Properties: Liquefied phenol is a colorless liquid which may develop a slight reddish tint on keeping. It has a characteristic, somewhat aromatic odor and the general chemical and physical characteristics of phenol.

Dosage: 0.05 Cc. or 1 minim.

Phenolphthaleinum (Phenolphthal.), Phenolphthalein, U. S. P.—A dibasic phenol derivative, dihydroxyphthalophenone $(C_6H_4OH)_2CO.C_6H_4CO$, produced by the interaction of phenol and phthalic anhydrid.

Properties: Phenolphthalein occurs as white, or faintly yellowish crystals or as an amorphous powder; nearly insoluble in water and freely soluble in alcohol (1: 13). Its solutions in acid liquids are colorless, but turn red when the liquid is made alkaline.

Action and Uses: Phenolphthalein acts as a purgative, but appears to possess no further physiologic action, except that it may cause some irritation of the rectum and lower bowel.

Dosage: The dosage varies according to its effect, from 0.06 Gm. to 0.5 Gm., or from 1 to 8 grains. A case of mild poisoning has been reported from taking 1 Gm. (15 grains).

Phenylis Salicylas (Phenyl. Salicyl.), Phenyl Salicylate, U. S. P. (Salol).—The phenylester, $C_6H_4(OH)COOC_6H_5$ 1:2, of salicylic acid.

Properties: Phenyl salicylate occurs as a white crystalline powder, having a faint aromatic odor and a slight but characteristic taste. It is very slightly soluble in water (1: 6,670) and freely soluble in alcohol (1: 6).

Action and Uses: Phenyl salicylate is slightly antiseptic. Its antiseptic action is greatly increased when it is decomposed into its constituents, phenol and salicylic acid. This is effected in the intestines by the fat-splitting

ferment of the pancreas. After absorption, it produces the effect of salicylates, but if larger doses are given the phenyl, of which it contains 40 per cent., may produce toxic effects. The urine may become dark-colored by phenol derivatives excreted by the kidneys, hence, salol should not be used for its constitutional effect as a salicylate. Phenyl salicylate is prescribed as intestinal antiseptic in diarrhea, enteritis, and "intestinal putrefaction." It is doubtful, however, whether this or other alleged intestinal antiseptics exert any appreciable control over the bacterial flora of the digestive tract. Salol is used in pharmacy for the purpose of coating enteric pills. It must be remembered that the coating of pills of moderate size entails the administration of a considerable dose of salol.

DOSAGE: From 0.2 to 0.5 Gm., or from 3 to 8 grains.

It is preferably administered in the form of powder and may be inclosed dry in capsules or cachets. Pills and compressed tablets are objectionable, because of the tendency of the substance to fuse into a hard, insoluble mass.

Phosphorus (Phosphor.), Phosphorus, U. S. P.—Must be carefully preserved under water.

PROPERTIES: Phosphorus is a translucent, nearly colorless solid, of a waxy luster, having, at ordinary temperatures, about the consistency of beeswax. It has a distinctive and disagreeable odor and taste and should not be exposed to air. It is practically insoluble in water but slightly soluble in dehydrated alcohol (1: 350). It takes fire readily when exposed to the air. Great care should be used in handling elementary phosphorus. It should be carefully kept under water in a moderately cool place. It should be cut, or otherwise divided, under water. It may be secured in the form of small particles by cautiously melting under water and shaking until cool.

ACTION AND USES: Small doses of phosphorus stimulate the formation of bone and have been used with apparent success in the treatment of rickets, and with less success for poorly uniting fractures. Slight overdosage may cause toxic symptoms. The presence of phosphorus compounds in nerve tissues led to the trial of phosphorus itself, and of all its various compounds, as "nerve foods," tonics and stimulants, especially in neurasthenia and allied conditions. Its use for this purpose has gradually been abandoned, as it is realized that "nervous exhaustion" is not due to deficiency of phosphorus compounds. Toxic doses of phosphorus produce nausea, vomiting and diarrhea. These subside, but after an interval of several days, they recur and are complicated by vomiting of blood, painful and enlarged liver, jaundice, drowsiness, and scanty pathologic urine. The nervous phenomena increase in severity to somnolence, delirium, coma, and sometimes convulsions. These symptoms are the result of acute hepatitis and extensive fatty degeneration of the viscera, particularly the liver. The bone marrow may be stimulated, but this effect cannot be utilized in therapeutics, since it requires toxic doses. In workers in phosphorus, chronic poisoning is shown by a necrosis of the lower jaw. It is perhaps due to infection

through carious teeth, which is favored by previous changes in the bone due to phosphorus.

DOSAGE: 0.5 mg. or 1/120 grain per day, for children. It may be administered either in the form of pills or as phosphorated oil (1:100).

Physostigminae Salicylas (Physostig. Salicyl.), Physostigmin Salicylate, U. S. P. (Eserin Salicylate).—The salicylate $C_{15}H_{21}O_2N_3.C_7H_6O_3$, of an alkaloid obtained from physostigma.

PROPERTIES: Physostigmin salicylate occurs as colorless or faintly yellowish, odorless crystals. It acquires a red tint on exposure to light and air. It is soluble in water (1:75) and in alcohol (1:16).

ACTION AND USES: Physostygmin stimulates the peripheral endings of the parasympathetic nerves and probably acts on the musculature to enhance its response to normal stimulation. Thus it increases intestinal peristalsis, and produces contraction of the pupil by local action. When instilled into one eye it causes contraction of the pupil on that side and not on the other. It stimulates the vagus, causing slowing of the pulse, dizziness, and faintness. It depresses the spinal cord. Physostigmin has been employed for its depressing action on the spinal cord in tetanus, strychnin poisoning, and other forms of convulsions, but it is not always reliable. Physostigmin is used occasionally to stimulate peristalsis in the paralytic form of constipation. It is employed chiefly in treatment of eye diseases for the purpose of contracting the pupil and also to reduce intraocular tension. For the latter purpose it is serviceable in glaucoma. It is a useful remedy in peripheral ulcer of the cornea. It may be employed to hasten recovery from the effect of mydriatics, such as homatropin. Physostigmin is used in the eye in solution (freshly prepared) of the strength of from 0.1 to 1 per cent., often in conjunction with cocain. For hastening recovery from a mydriatic, a drop of 0.1 per cent. solution may be employed.

DOSAGE: 0.001 Gm. or 1/60 grain. The following mixture may be used in glaucoma:

℞ Cocainae hydrochloridi ..... 0.02 Gm.
Physostigminae salicylatis ..... 0.01 Gm.
Aquae destillatae ..... 10.0 Cc.

Pilocarpinae Hydrochloridum (Pilocarpin. Hydrochl.), Pilocarpin. Hydrochlorid, U. S. P. (Pilocarpin Chlorid).—The hydrochlorid, $C_{11}H_{16}O_2N_2.HCl$, of an alkaloid obtained from pilocarpus.

PROPERTIES: Pilocarpin hydrochlorid occurs as colorless or white translucent crystals, odorless and having a faintly bitter taste. It is hygroscopic, very soluble in water (1:0.3), and freely soluble in alcohol (1:3).

ACTIONS AND USES: See **Pilocarpinae Nitras.**

DOSAGE: From 0.001 to 0.01 Gm. or from 1/60 to 1/6 grain.

Pilocarpinae Nitras (Pilocarpin. Nit.), Pilocarpin Nitrate, U. S. P.—The nitrate, $C_{11}H_{16}O_2N_2.HNO_3$, of an alkaloid obtained from pilocarpus.

PROPERTIES: This salt is less soluble in both water (1: 4) and alcohol (1: 75) than is the hydrochlorid, but has the advantage over that salt of being permanent in air.

ACTION AND USES: Pilocarpin stimulates the endings of the parasympathetic nerves. It increases secretion of the salivary, mucous and sweat glands. It stimulates the unstriated muscles of the body generally, including the motor system of the intestines and bronchi. The vagus stimulation produced by it which would cause slowing of the pulse and a fall of blood pressure is unimportant in man, as it is soon followed by vagus depression with an accelerated pulse rate. It contracts the pupil and causes spasm of the muscles of accommodation by a peripheral action. Pilocarpus is administered internally chiefly for its diaphoretic effect, especially in nephritis. It may also be of service in certain diseases of the skin. In doses just short of producing free diaphoresis it is sometimes of great benefit to relieve itching in generalized acute eczema, urticaria, pruritus, etc. In diseases of the eye, such as glaucoma, corneal ulcer, etc., pilocarpin is employed as a weak miotic.

DOSAGE: 0.01 Gm. or ⅙ grain. Smaller doses of 1 mg. or 1/100 grain are sometimes preferable.

Pix Liquida (Pix. Liq.), Tar, U. S. P. (Pine Tar).—A product obtained by the destructive distillation of the wood of *Pinus palustris.*

PROPERTIES: Tar occurs as a semiliquid, viscid, blackish-brown product having an empyreumatic odor and a sharp and empyreumatic taste. Tar is miscible with alcohol and fixed or volatile oils, but is only partially soluble in water.

ACTION AND USES: Tar is an irritant to the skin, having antiseptic and antipruritic properties; often employed as the first remedy in changing the treatment from sedative to stimulating applications in dermatitis. When taken internally it stimulates the bronchial mucous membrane. The syrup is a rather feeble remedy for subacute bronchitis.

DOSAGE: In beginning treatment with tar, the strength should be from 2 to 4 per cent. This is especially true when it is employed as antipruritic in acute inflammatory conditions. In chronic cases it is used in the strength of from 6 to 20 per cent., and sometimes the pure tar is applied. For use as an antiseptic in skin affections, the following formula may be employed:

℞ Picis liquidae ..... 2.0 Gm.
Potassii hydroxidi ..... 1.0 Gm.
Aquae ..... 8.0 Cc.

This must be diluted for use.

The dose of the syrup is 4 Cc. or 1 fluidram.

Unguentum Picis Liquidae (Ung. Pic. Liq.), Tar Ointment, U. S. P.—A mixture of tar (50 Gm.) with yellow wax and lard to make 100 Gm.

This should usually be diluted from 10 to 20 times before application. In chronic conditions, scaly eruptions, psoriasis and ringworm it may be applied in full strength.

Plumbi Acetas (Plumb. Acet.), Lead Acetate, U. S. P. (Sugar of Lead.).—Corresponds to not less than 99.5 per cent. of $Pb(C_2H_3O_2)_2+3H_2O$.

Properties: Lead acetate occurs as colorless or heavy white crystalline masses or granular crystals, having a faintly acetous odor and a sweetish, astringent, afterward metallic taste. It is freely soluble in water (1: 1.4) and soluble in alcohol (1: 38).

Incompatibilities: Solutions of lead salts are incompatible with carbonates, hydroxids, iodids, chlorids and sulphates.

Action and Uses: Lead acetate is an astringent. A saturated alcoholic solution is used as a lotion in ivy-poisoning.

Dosage: 0.06 Gm. or 1 grain.

Liquor Plumbi Subacetatis (Liq. Plumb. Subacet.), Solution of Lead Subacetate, U. S. P. (Goulard's Extract).—An aqueous solution containing lead subacetate corresponding to not less than 18 per cent. of lead (Pb.). It is made by boiling a mixture of lead acetate, lead oxid and distilled water for half an hour.

Properties: Solution of lead subacetate occurs as a clear, colorless liquid, odorless, having a sweetish, astringent taste and an alkaline reaction.

Dosage: This preparation should be diluted from fifteen to thirty times before application. It is employed as an astringent and antipruritic in inflammatory conditions of the skin and as an application to sprains and bruises. It should not be applied to denuded surfaces and should be used with caution on the face.

Podophyllum (Podoph.), Podophyllum, U. S. P. (Mandrake, May Apple Rhizome).—The dried rhizome of *Podophyllum peltatum.* Used in medicine chiefly in the form of:

Resina Podophylli (Res. Podoph.), Resin of Podophyllum, U. S. P. (Podophyllin).

Properties: Resin of podophyllum occurs as an amorphous powder, varying in color from light brown to pale greenish-yellow, turning darker when subjected to heat exceeding 25 C., or when exposed to light.

Action and Uses: Resin of podophyllum is very irritating to mucous membranes, especially to that of the eyes. It has a slight, peculiar odor and a faintly bitter

taste. It is very soluble in alcohol, but practically insoluble in water. It is used as a cathartic, chiefly in the form of pills. It was formerly thought to exercise a special influence on the liver, but this idea has been abandoned. It is chiefly used in small doses for the treatment of chronic constipation.

DOSAGE: From 0.003 to 0.03 Gm. or from 1/20 to 1/2 grain. As its effects are somewhat uncertain, it is advisable to commence with the small dose mentioned, to be increased as required. As it takes from twelve to twenty-four hours for action, it is usually given at bed-time.

Potassii Acetas (Pot. Acet.), Potassium Acetate, U. S. P.—Contains not less than 99 per cent. of $KC_2H_3O_2$.

PROPERTIES: Potassium acetate occurs as a white powder or in crystalline masses, odorless, and having a saline taste; it is deliquescent on exposure to air. It is very soluble in water (1: 0.5), and is freely soluble in alcohol (1: 2.9).

ACTION AND USES: Potassium acetate is used as an alkaline diuretic in nephritis, and to render the urine less irritant in cystitis. It is also employed in fevers and in rheumatism. Potassium acetate is oxidized in the organism to potassium carbonate or bicarbonate. This tends to increase the alkaline reserve of the body. The salts excreted by the kidneys render the urine less acid, and, after large doses, alkaline. It is an effective diuretic, increasing the amount of urine and the solids of the urine without irritation of the kidneys. It is preferable to more irritant diuretics in the treatment of nephritis, but should not be used in acute nephritis. Potassium salts are poisonous in excessive doses, but ordinarily the excretion is so efficient that there is no danger of toxic effects when therapeutic doses are administered by mouth. Toxic effects have been reported, however, after the administration of large doses in nephritis, and if an acetate is indicated, it is better to use the sodium salt.

DOSAGE: 1 Gm. or 15 grains once in three hours until the urine becomes sufficiently alkaline.

Potassii Bicarbonas (Pot. Bicarb.), Potassium Bicarbonate, U. S. P.—Contains not less than 99 per cent. of $KHCO_3$.

PROPERTIES: Potassium bicarbonate occurs as colorless, transparent crystals, or a white, granular powder, odorless, having a saline and slightly alkaline taste; it is permanent in the air. It is freely soluble in water (1: 2.8), but is practically insoluble in alcohol.

INCOMPATIBILITIES: It is incompatible with acids.

ACTION AND USES: Potassium bicarbonate is sometimes used to neutralize the acidity of the stomach, but sodium bicarbonate is usually preferred. It may be employed for the extemporaneous preparations of potassium acetate or

potassium citrate. If a solution of acetic or citric acid or lemon juice is neutralized with potassium bicarbonate, an equivalent dose of potassium acetate or citrate is formed. Potassium bicarbonate tends to increase the reserve alkalinity of the body, and to lessen the acidity of the urine. It may be given to secure the same alkaline effects for which the acetates or citrates are usually employed. Externally, potassium bicarbonate may be employed for its alkaline effects, for the purpose of softening the epidermis.

DOSAGE: 1 Gm. or 15 grains.

Potassii Bitartras (Pot. Bitar.), Potassium Bitartrate, U. S. P. (Cream of Tartar).—Contains not less than 99.5 per cent. of $KHC_4H_4O_6$.

PROPERTIES: Potassium bitartrate occurs as a colorless or slightly opaque or white, somewhat gritty powder, odorless and having a pleasant acidulous taste. It is slightly soluble in water (1: 155) and nearly insoluble in alcohol (1: 8,820).

ACTION AND USES: Potassium bitartrate is diuretic and aperient. It is used chiefly in combination with jalap as a hydragogue cathartic. See Pulvis Jalapae Compositus under **Jalap.**

DOSAGE: 2 Gm. or 30 grains. Preferably administered in the form of a powder.

Potassii Bromidum (Pot. Brom.), Potassium Bromid, U. S. P. —Contains not less than 98.5 per cent. of KBr.

PROPERTIES: Potassium bromid occurs as colorless or white cubical crystals or granular powder, odorless and having a very strongly saline taste. It is freely soluble in water (1: 1.5), but only slightly soluble in alcohol (1: 250).

INCOMPATIBILITIES: It is incompatible with mineral acids or oxidizing agents and with salts of silver or lead.

ACTION AND USES: Potassium bromid is a nerve sedative. It diminishes reflex excitability and depresses the motor area of the cortex. In large doses it is depressant to the circulation. When continued long it disturbs the nutrition and may produce irritation of the skin similar to that produced by the use of iodids. Potassium bromid is used to relieve convulsions, either of cerebral or of spinal origin. For this reason it is given in epilepsy. Large doses are also given to relieve the spasms of tetanus. Potassium bromid is also useful to quiet nervous excitability in neurasthenia and hysteria. It may be given as an adjunct to hypnotics, such as chloral. It is said to be of value for the prevention of seasickness. The effects of potassium bromid are also produced by sodium bromid, and the latter salt is often preferred as being less irritating.

DOSAGE: 1 Gm. or 15 grains, freely diluted with water or with milk, usually given after meals and at bed-time. The dose may be increased to 5 Gm. or more if a powerful action is indicated.

Potassii Carbonas (Pot. Carb.), Potassium Carbonate, U. S. P. —Contains not less than 99 per cent. of K_2CO_3.

PROPERTIES: Potassium carbonate occurs as a white, granular powder, odorless and having a strongly alkaline taste. It is very soluble in water (1: 0.9), but practically insoluble in alcohol.

ACTION AND USES: Potassium carbonate is antacid, but because of its strongly alkaline and caustic properties is rarely used internally unless largely diluted. Solutions are applied externally to soften the epidermis.

Potassii Chloras (Pot. Chloras), Potassium Chlorate, U. S. P. —Contains not less than 99 per cent. of $KClO_3$.

PROPERTIES: Potassium chlorate is explosive when mixed with oxidizable matter, and caution should be observed in manipulating it. It occurs as colorless crystals or a white granular powder, odorless and having a cooling and characteristic taste. It is soluble in water (1: 11.5), but nearly insoluble in alcohol.

ACTION AND USES: Potassium chlorate is much used as a mouth wash in various forms of stomatitis. It is also employed as a gargle in the treatment of pharyngitis. Its value in these conditions, however, is uncertain. Its internal use is not to be recommended. Large doses are actively poisonous, causing the formation of methemoglobin and the disintegration of the blood-corpuscles.

DOSAGE: A saturated solution may be used as a mouth wash or gargle.

Potassii Citras (Pot. Cit.), Potassium Citrate, U. S. P.— Contains not less than 99 per cent. of $K_3C_6H_5O_7+H_2O$.

PROPERTIES: Potassium citrate occurs as transparent, prismatic crystals or a white granular powder, odorless, and having a cooling, saline taste. It is very soluble in water (1: 0.6), but very slightly soluble in alcohol.

ACTION AND USES: The actions of potassium citrate are much like those of the acetate, but it is less readily absorbed and consequently in large doses is more laxative.

DOSAGE: 1 Gm. or 15 grains.

POTASSII CITRAS EFFERVESCENS (POT. CIT. EFF.), EFFERVESCENT POTASSIUM CITRATE, U. S. P.—A mixture of potassium citrate (20 per cent.) with sodium bicarbonate, tartaric acid and citric acid.

DOSAGE: 4 Gm. or 1 dram.

Potassii et Sodii Tartras (Pot. et Sod. Tart.), Potassium and Sodium Tartrate, U. S. P. (Rochelle Salt).—Contains not less than 99 per cent. of $KNaC_4H_4O_6.4H_2O$.

PROPERTIES: Potassium and sodium tartrate occurs as colorless, transparent crystals or white powder, odorless and having a cooling saline taste. It is freely soluble in water (1: 0.9), but practically insoluble in alcohol.

ACTION AND USES: Potassium and sodium tartrate is used as a saline cathartic.

DOSAGE: 10 Gm. or 2½ drams.

PULVIS EFFERVESCENS COMPOSITUS (PULV. EFF. CO.), COMPOUND EFFERVESCING POWDER, U. S. P. (Seidlitz Powder).—A mixture of sodium bicarbonate (2.5 Gm.), potassium and sodium tartrate (7.5 Gm) and tartaric acid (2.1 Gm.).

The sodium bicarbonate is mixed with the potassium and sodium tartrate and the mixture is wrapped in a blue paper. The tartaric acid is wrapped in a white paper.

DOSAGE: The contents of two papers, generally taken on an empty stomach in the morning. The contents of each paper are dissolved in about ¼ tumblerful of water, the solutions mixed, and the mixture is taken while effervescing.

Potassii Hydroxidum (Pot. Hydrox.), Potassium Hydroxid, U. S. P. (Caustic Potash, Potassium Hydrate).—Should contain not less than 85 per cent. of KOH.

PROPERTIES: Potassium hydroxid occurs as dry, white or nearly white flakes, fused masses, or sticks, hard and brittle, showing a crystalline fracture, odorless and having, in dilute solutions, a very acrid and caustic taste. It rapidly destroys organic tissues, and great caution is necessary in handling. It is very soluble in water (1: 0.9) and freely soluble in alcohol (1: 3).

LIQUOR POTASSII HYDROXIDI (LIQ. POT. HYDROX.), SOLUTION OF POTASSIUM HYDROXID, U. S. P. (Liquor Potassae. Solution of Potassa).—One hundred Cc. contain about 5 Gm. of potassium hydroxid (KOH).

ACTION AND USES: Solution of potassium hydroxid is antacid, but, because of its irritant action, is seldom used internally, and when so employed should be largely diluted. Its action on the urine is similar to that of potassium carbonate, acetate or citrate. The carbonate and hydroxid are less satisfactory for the purpose than the acetate, and citrate, because of the possible deleterious effects of these alkalies in the stomach. Externally it may be used to soften the epidermis for the removal of warts, corns, etc.

Potassii Iodidum (Pot. Iod.), Potassium Iodid, U. S. P.—Contains not less than 99 per cent. of KI.

PROPERTIES: Potassium iodid occurs as colorless or opaque white, cubical crystals, or a white granular powder, having a peculiar, faint, iodin-like odor, and a pungent, saline, afterward bitter taste. It is very soluble in water (1: 0.7) and soluble in alcohol (1: 22).

INCOMPATIBILITIES: Potassium iodid is incompatible with mineral acids and oxidizing agents and should not be prescribed in solution with alkaloids or alkaloid-containing drugs.

Action and Uses: Potassium iodid is regarded as an alterative. Its tendency to increase secretion in the bronchi makes it of value in subacute and chronic bronchitis. The most remarkable action of iodids is their action in hastening the absorption of gummatous exudates in tertiary syphilis. The iodid does not destroy the spirochetes, but possibly causes the formation of a proteolytic ferment that has a selective action on the round cells composing the gumma. By promoting the absorption of cellular exudates in the walls of the blood vessels, it exerts a beneficial influence in many cases of arteriosclerosis and aortitis. There is evidence that the forms of arterial disease which are improved by iodids are of syphilitic origin. A similar absorptive action, almost specific, is seen after administration of large doses of iodids in the granulomatous lesions of actinomycosis, sporotrichosis and blastomycosis. Potassium iodid is used to promote the elimination of mercury and lead. The sodium salt is perhaps preferable, as it is probably less irritant to the stomach. Potassium iodid is slightly irritating to the gastro-intestinal canal, especially the stomach. After absorption, therapeutic doses ordinarily produce no symptoms. In large or moderate doses, or if long continued, it frequently produces symptoms of iodism. These are due to irritation of the nasal passages, the bronchi and the skin. The irritation of the nose is shown by coryza, and by pain in the region of the frontal sinus. On the skin it produces various eruptions, generally of a papular character, which rarely become pustular. Eruption and inflammation of the skin may sometimes be so extensive as to produce constitutional depression. In iodism there are often symptoms resembling those of exophthalmic goiter—tachycardia, tremor, nervous irritability, etc. There may also be wasting.

Dosage: The dosage varies in nonsyphilitic cases from 0.3 to 2 Gm. or from 5 to 30 grains, but in cases of syphilis, especially in the tertiary form, much larger doses up to 5 Gm. and more may be necessary. It is often prescribed as follows:

℞ Potassii iodidi ..... 30.0 Gm.
Aquae destillatae .....ad 60.0 Cc.
M. Sig.: Five drops in a glassful of milk, three times daily after meals; increase by 1 drop per day added to each dose.

On the occurrence of symptoms of iodism, such as coryza, papular or pustular eruptions, rapid pulse, etc., the remedy should be discontinued and resumed in smaller doses after the disappearance of toxic symptoms.

Potassii Permanganas (Pot. Permang.), Potassium Permanganate, U. S. P.—Contains not less than 99 per cent. of $KMnO_4$.

PROPERTIES: Potassium permanganate occurs as slender prisms, of a dark purple color, almost opaque by transmitted light and of a blue metallic luster by reflected light, odorless and having a taste which is at first sweet but afterward disagreeable and astringent. It is soluble in water (1: 13.5) and decomposes when brought into contact with alcohol.

ACTION AND USES: Potassium permanganate has marked oxidizing properties and is used for this purpose in the treatment of certain forms of poisoning when the poison is still in the stomach. In morphin poisoning the stomach should be washed with a solution of potassium permanganate (1: 2,000). The same treatment is useful in phosphorus poisoning. In cases of snake bite it may be given by hypodermic injections of a solution (1: 500) in the vicinity of the wound. Potassium permanganate is deodorant, germicidal, irritant and astringent. It is used on mucous membranes, especially the urethra, in dilutions of 1: 5,000 to 1: 1,000. It has been used to disinfect the hands in surgery. The hand is dipped into the disinfectant solution until it is a mahogany brown, and then dipped into a warm saturated solution of oxalic acid and rinsed in sterile water. It is applied externally for excessive sweating of the feet (solutions of 1: 500). Internally, potassium permanganate has been used as emmenagogue, but is probably useless for this purpose.

DOSAGE: 0.06 Gm. or 1 grain, usually administered in the form of pills, being mixed with kaolin and massed with petrolatum.

Procaina, Procain, N. N. R. (Novocain).—$CH_2(C_6H_4NH_2CO O).CH_2N.(C_2H_5)_2$. The monohydrochlorid of para-amino-benzoyl-diethyl-amino-ethanol.

PROPERTIES: Procain occurs as fine colorless needles. It is freely soluble in water (1: 1) and soluble in alcohol (1: 30).

ACTION AND USES: Procain is a local anesthetic. Its applications are discussed under Cocaina.

DOSAGE: For infiltration anesthesia, solutions of 0.25 Gm. (4 grains) in 100 or 50 Cc. (3.2 or 1.6 ounces) physiologic sodium chlorid solution, with 5 or 10 drops of epinephrin solution (1: 1,000); for instillations and injections, solutions of 0.1 Gm. (1½ grains) in 10 or 15 Cc. (150 or 225 minims) sodium chlorid solution with or without 10 drops of epinephrin solution (1: 1.000). In ophthalmology, 1 to 5 per cent. or even up to 10 per cent. solution, in rhinolaryngology from 5 to 20 per cent. solutions are recommended, with the addition of from 6 to 8 drops of epinephrin solution (1: 1,000) to each 12 Cc. (150 minims).

Protargin Fortius, Protargin Strong, N. N. R. (Silver Protein —Protargol Type).—A colloidal compound of silver oxid and protein containing 7 to 8.5 per cent. of silver. The brands described in N. N. R. differ somewhat in composition but are essentially equivalent therapeutically. They are proganol, protargentum-Squibb and protargol.

PROPERTIES: Protargin strong usually occurs as a brown powder, freely but slowly soluble in water (about 1: 2) forming colloidal "solutions"; it is also "soluble" in glycerin but insoluble in alcohol and oils. "Solutions" are dark in color (but less deeply colored than solutions of mild protargin). "Solutions" are best prepared by sprinkling the substance on distilled water and allowing solution to take place spontaneously.

INCOMPATIBILITIES: Acids and concentrated salt solutions.

ACTION AND USES: Protargin strong is a fairly efficient antiseptic of the mucous membrane, especially against gonococcus infection. It is less powerful than silver nitrate, but this objection can be overcome by the use of stronger solutions. It does not precipitate protein and is, therefore, nonastringent and almost nonirritant. This is a distinct advantage in the prophylaxis and treatment of infections of sensitive mucous membranes, such as the urethra, eye, ear, nose and throat.

DOSAGE: Protargin strong is used in 0.25 to 1 per cent. solutions for instillations or injections; in 1: 1,000 to 1: 2,000 solutions as irrigations. It is also used in the form of tampons and bougies.

Protargin Mite, Protargin Mild, N. N. R. (Silver Protein—Argyrol Type).—A colloidal compound of silver oxid and a protein derivative containing from 19 to 30 per cent. of silver. The brands of protargin mild differ somewhat in composition but are essentially equivalent therapeutically. The following brands are included in N. N. R.: argyn, argyrol, cargentos, silvol, solargentum-Squibb and vargol.

PROPERTIES: Protargin mild occurs in black, lustrous scales or granules freely soluble in water to form deeply colored colloidal "solutions"; it is also "soluble" in glycerin, but insoluble in alcohol and oils.

INCOMPATIBILITIES: Acids and strong solutions of salts.

ACTIONS AND USES: Protargin mild differs from protargin strong in being entirely nonirritant; it is also less active as an antiseptic, but is more soothing. The high specific gravity of its solutions facilitates their spreading and mechanically facilitates displacement of pus and secretions.

DOSAGE: Protargin mild is usually employed in concentrations of from 10 to 25 per cent., but may be used up to 50 per cent., applied several times daily.

Prunus Virginiana (Prun. Virg.), Wild Cherry, U. S. P. (Wild Black Cherry Bark).—The bark of *Prunus serotina,* used in medicine principally in the form of:

SYRUPUS PRUNI VIRGINIANAE (SYR. PRUN. VIRG.), SYRUP OF WILD CHERRY, U. S. P.—Represents an aqueous extract of 15 per cent. of wild cherry bark in the form of syrup.

INCOMPATIBILITIES: As it contains tannins it is incompatible with salts of iron.

ACTION AND USES: Syrup of wild cherry is largely used as a vehicle for cough medicines.

DOSAGE: 4 Cc. or 1 fluidram.

Quinidinae Sulphas, Quinidin Sulphate, N. N. R.—The sulphate, $(C_{20}H_{24}O_2N_2)_2.H_2SO_4+2H_2O$, of the alkaloid quinidin.

PROPERTIES: Quinidin sulphate occurs as minute, silky, white crystals, usually cohering in tufted masses: odorless; taste very bitter and persistent; permanent in the air. On exposure to light, it acquires a brownish tint. Quinidin sulphate is soluble in water, alcohol and chloroform.

ACTION AND USES: Quinidin, like quinin, is a protoplasm poison, affecting protozoa more than bacteria. Quinidin acts on the heart in such a manner as to bring about the cessation of fibrillation of the auricles in a certain proportion of instances. The pharmacology of the drug has been extensively investigated. It has been shown that quinidin increases the refractory period of auricular muscle and decreases its irritability and the rate of conductivity. Its action is both on the auricular muscle and through the vagus. In ordinary doses the heart is slowed and the auriculoventricular conduction time is lengthened.

Quinidin, in the form of quinidin sulphate, is used to restore the normal rhythm of the heart in cases of auricular fibrillation. This has been brought about in approximately 50 per cent. of the reported cases in which the drug was used. It appears to be most efficacious in the treatment of cases of fibrillation of short duration or of the paroxysmal type. It is least effective in cases of fibrillation with marked cardiac insufficiency. Quinidin is not without untoward and even dangerous effects. Some patients appear to be more susceptible to its intoxication than others. The untoward symptoms brought about by its use in these patients are nausea, vomiting, convulsions, palpitation, headache, faintness and flushing. In a few instances, such serious results as rapid idioventricular rhythms (ventricular tachycardia) have been initiated during the course of therapy. Toxic effects may appear after the establishment of a normal rhythm. Some cases have been reported in which sudden death occurred a short time after the drug had been stopped. The drug is rapidly eliminated and it appears that no cumulative effect can take place. It has no known permanent effect.

DOSAGE: 0.2 Gm. or 3 grains of quinidin sulphate commonly is given as a preliminary dose and is repeated after two hours to determine the patient's susceptibility to the drug. If there are no symptoms following this preliminary dose, therapeutic administration is begun on the following day when from 0.2 Gm. to 0.4 Gm. or 3 to 6 grains is given from three to five times daily, for from one to three days. As a rule, if the establishment of the normal rhythm can be effected, the change occurs after from one to three days' treatment. The maximum dose per day advised by most

authors is from 1 to 2 Gm. or 15 to 30 grains. If toxic symptoms occur, the administration of the drug should be discontinued.

Quinina (Quin.), Quinin, U. S. P.—An alkaloid, $C_{20}H_{24}O_2N_2+3H_2O$, obtained from the bark of various species of Cinchona.

PROPERTIES: Quinin occurs as white, flaky, microcrystalline powder, odorless and having a bitter taste. It is very slightly soluble in water (1: 1,560), but very soluble in alcohol (1: 0.8).

ACTION AND USES: Quinin is a protoplasmic poison, affecting protozoa more than bacteria. It is somewhat irritant to the stomach and intestines and when absorbed it causes ringing in the ears, but in moderate doses produces no other marked effects in healthy persons. In patients with fever it is antipyretic. Its chief use is as an antiperiodic in malaria. In this disease it should be given in large doses several hours before the time of the expected chill. In large doses it produces depression of the heart and respiration, and collapse. Such doses may produce more or less complete hemianopia terminating in permanent loss of sight. Moderately large doses of quinin act as a stimulant to the uterine muscles, but do not produce such spasmodic contractions as ergot. Quinin is said to have ecbolic action. Quinin may be used as a tonic, like the simple bitters, for the improvement of digestion and nutrition. Its solutions produce local anesthesia, especially the solution of quinin and urea hydrochlorid. The ordinary quinin salts are irritant.

DOSAGE: 0.1 to 0.25 Gm. or 1½ to 4 grains. In malaria 1 Gm. or 15 grains may be given at a dose. Urgent cases may require intramuscular or intravenous injection; see **Quininae et Ureae Hydrochoridum**. For ordinary use it is preferably administered in the form of capsules. For use as a bitter tonic it is given in solution. For its use as a local anesthetic see **Quininae et Ureae Hydrochoridum**. In medicine quinin is customarily used in the form of one of its salts. The intensely bitter taste of quinin and its soluble salts constitutes the greatest objection to its use, especially with children. It may be masked by administering the alkaloid or the insoluble tannate in mixture containing glycyrrhiza or syrup of yerba santa (Syrupus Eriodictyi Aromaticus, N. F.).

Quininae Bisulphas (Quin. Bisulph.), Quinin Bisulphate, U. S. P.—The acid sulphate, $C_{20}H_{24}O_2N_2.H_2SO_4+7H_2O$, of the alkaloid quinin.

PROPERTIES: Quinin bisulphate occurs in colorless, transparent crystals or as small whitish needles, odorless and having a very bitter taste. It is freely soluble in water (1: 8.5), and soluble in alcohol (1: 18).

DOSAGE: Tonic, 0.1 Gm. or 1½ grains; antimalarial, 1 Gm. or 15 grains.

Quininae et Ureae Hydrochloridum (Quin. et Urea. Hydrochl.), Quinin and Urea Hydrochlorid, U. S. P. (Quinin and Urea Chlorid).—The compound of quinin hydrochlorid and urea hydrochlorid, $C_{20}H_{24}O_2N_2.HCl.CO(NH_2)_2.HCl+5H_2O$, containing not less than 58 per cent. of anhydrous quinin.

PROPERTIES: Quinin and Urea Hydrochlorid occurs as colorless prisms or as a white, granular powder, odorless and having a very bitter taste. It is freely soluble in water (1: 0.9) and in alcohol (1: 2.4).

ACTION AND USES: Quinin and urea hydrochlorid has the actions of quinin. When injected hypodermically it exerts an anesthetic action much more prolonged than that of cocain. It is reported that the anesthesia is in some cases prolonged for several days. Injections of strong solutions produce sufficient irritation to cause fibrosis. Quinin and urea hydrochlorid is useful in the treatment of malaria by intramuscular or intravenous injection.

DOSAGE: Tonic and antimalarial, the same as that of quinin. For the production of local anesthesia, injection of a solution of from 0.25 to 1 per cent. strength is said to be free from the risk of producing fibrous indurations, which occurs with stronger solution. For application to mucous membranes solutions varying in strength from 10 to 20 per cent. should be used. For intramuscular injection, 1 Gm. in 10 Cc. may be employed; but care should be exercised not to inject this near important nerves. For intravenous injection, the solution should be much more dilute, not over ½ of 1 per cent. This must be injected slowly or the quinin may paralyze the heart.

Quininae Hydrochloridum (Quin. Hydrochl.), Quinin Hydrochlorid, U. S. P. (Quinin Chlorid).—The hydrochlorid, $C_{20}H_{24}O_2N_2.HCl+2H_2O$, of the alkaloid quinin.

PROPERTIES: Quinin hydrochlorid occurs as white, silky, glistening needles, odorless and having a very bitter taste. It is soluble in water (1: 18) and very soluble in alcohol (1: 0.8).

DOSAGE: Tonic, 0.1 Gm. or 1½ grains; antimalarial, 1 Gm. or 15 grains.

Quininae Sulphas (Quin. Sulph.), Quinin Sulphate, U. S. P.—The sulphate, $(C_{20}H_{24}O_2N_2)_2H_2SO_4+7H_2O$, of the alkaloid quinin.

PROPERTIES: Quinin sulphate occurs as white, glistening crystals of prismatic needles, odorless and having a very bitter taste. It is only slightly soluble in water (1: 725) and in alcohol (1: 107).

DOSAGE: Tonic, 0.1 Gm. or 1½ grains; antimalarial, 1 Gm. or 15 grains.

Quininae Tannas (Quin. Tann.), Quinin Tannate, U. S. P.—A compound of the alkaloid quinin with tannic acid containing from 30 to 35 per cent. of quinin.

PROPERTIES: Quinin tannate occurs as an amorphous, pale, lemon-yellow, odorless powder without taste, or at most slightly bitter, with scarcely an astringency. It is only slightly soluble in water, but freely soluble in alcohol (1: 3).

DOSAGE: 0.5 Gm. or 8 grains.

Resorcinol (Resorcin.), Resorcinol, U. S. P. (Resorcin).—The diatomic phenol, metadihydroxybenzene, $C_6H_4(OH)_2$ 1 : 3.

PROPERTIES: Resorcinol occurs as colorless or nearly colorless needle-shaped crystals, having a faint, peculiar odor and a sweetish, followed by a bitter taste. It is very soluble in water (1: 0.9) and in alcohol (1: 0.9).

ACTION AND USES: Resorcinol is antiseptic, antizymotic and antipyretic. On account of the readiness with which it causes the formation of methemoglobin and the resulting danger of collapse it is seldom administered internally. It is sometimes given to check fermentation in the stomach. Applied externally it is astringent in from 1 to 3 per cent. solutions, and produces exfoliation of the epidermis in strong proportions, from 10 to 20 per cent.

DOSAGE: 0.125 Gm. or 2 grains.

Rheum, Rhubarb, U. S. P.—The rhizome and roots of *Rheum officinale* and of other species of *Rheum*.

ACTION AND USES: Rhubarb is occasionally administered either in the form of powder or in the form of "cubes" or "fingers"; but more commonly employed in form of one of its preparations. Rhubarb and the extract are cathartics, bitter tonics and stomachics, while the aromatic tincture and the aromatic syrup are laxative and to a slight extent astringent. As cathartics they act chiefly on the colon and have a tendency to produce constipation after the initial laxative effect. Hence they are an appropriate remedy in the beginning of diarrhea as they cause the expulsion of irritating substances and promote a return to normal by their constipating influence.

EXTRACTUM RHEI (EXT. RHEI), EXTRACT OF RHUBARB, U. S. P. (Powdered Extract of Rhubarb).—A hydro-alcoholic extract of rhubarb evaporated to dryness and powdered. Represents twice its weight of rhubarb.

DOSAGE: 0.25 Gm. or 4 grains.

TINCTURA RHEI AROMATICA (TR. RHEI AROM.), AROMATIC TINCTURE OF RHUBARB, U. S. P.—Represents rhubarb (20 Gm.), cinnamon (4 Gm.), cloves (4 Gm.) and myristica (2 Gm.), in a mixture of glycerin, alcohol (46 per cent.) and water to make 100 Cc.

DOSAGE: 2 Cc. or 30 minims.

Syrupus Rhei Aromaticus (Syr. Rhei Arom.), Aromatic Syrup of Rhubarb, U. S. P. (Spiced Syrup of Rhubarb).—For all practical purposes this represents aromatic tincture of rhubarb (15 Cc.) with sufficient syrup to make 100 Cc.

Dosage: 10 Cc. or 2½ fluidrams. This is a pleasant preparation, especially suitable for children.

Rosa, Rose.—Used in pharmacy chiefly in the form of:

Aqua Rosae (Aq. Ros.), Rose-Water, U. S. P.—A solution of the volatile oil of rose in water. It is official as Aqua Rosae and as Aqua Rosae Fortior. The latter, a saturated aqueous distillate, is twice the strength of the former.

Action and Uses: Rose-water and stronger rose-water are used for flavoring.

Saccharum (Sacch.), Sugar, U. S. P.—Refined sucrose, $C_{12}H_{22}O_{11}$, obtained from various sources.

Properties: Sugar is official in the form of white, dry, hard, distinctly crystalline granules, odorless and having a purely sweet taste. It is very soluble in water (1: 0.5) and soluble in alcohol (1: 170).

Action and Uses: In medicine it is used for its sweet taste. Properly prepared concentrated sugar solutions, such as the official syrups, have good keeping qualities; dilute sugar solutions are prone to undergo fermentation.

Saccharum Lactis (Sacch. Lact.), Sugar of Milk, U. S. P. (Milk-Sugar, Lactose).—A crystalline sugar, $C_{12}H_{22}O_{11} + H_2O$, obtained from the whey of cow's milk by evaporation, and purified by recrystallization.

Properties: Sugar of milk occurs as white, hard, crystalline masses or a white powder feeling gritty on the tongue, odorless and having a faintly sweet taste. It is freely soluble in water (1: 4.9), but practically insoluble in alcohol.

Action and Uses: Sugar of milk is used as a diluent, and also as a food, particularly in connection with modified milk for infants.

Santoninum (Santonin.), Santonin, U. S. P.—The inner anhydrid or lactone of santonic acid obtained from *Artemisia cina* and possibly other species of *Artemisia*.

Properties: Santonin occurs as colorless, rhombic prisms or a crystalline powder, odorless and nearly tasteless when first put into the mouth, but afterward developing a bitter taste. It is very slightly soluble in water (1: 5,300), and soluble in alcohol (1: 43).

Action and Uses: Santonin is used for its poisonous action on intestinal parasites, especially against roundworms. In proper doses and given under medical supervision it may be prescribed with reasonable safety. When absorbed to a sufficient extent to produce symptoms, the chief effects are yellow vision and epileptiform convulsions.

DOSAGE: 0.06 Gm. or 1 grain. It is frequently administered with calomel. As absorption is to be avoided the remedy is preferably administered in the form of coarse crystals, either inclosed in a capsule or made up into a lozenge rather than in finely powdered form. The soluble sodium santoninate should be avoided as a vermifuge.

Sapo, Soap, U. S. P. (White Castile Soap).—Soap prepared from sodium hydroxid and olive-oil (Castile soap).

PROPERTIES: Soap occurs as a white or whitish solid, hard yet easily cut when fresh, or as a fine yellowish white powder, having a faint peculiar odor free from rancidity, a disagreeable alkaline taste and an alkaline reaction. It is soluble in water and in alcohol.

LINIMENTUM SAPONIS (LIN. SAPON.), SOAP LINIMENT, U. S. P. (Liquid Opodeldoc).—A solution of soap, camphor and oil of rosemary in a mixture of alcohol and water.

ACTION AND USES: Soap liniment applied externally is stimulant and rubefacient, but is used more frequently as a vehicle for the local application of other more active counterirritants.

Sapo Mollis (Sapo Moll.), Soft Soap, U. S. P.—A soap prepared from potassium hydroxid and cottonseed oil.

PROPERTIES: Soft soap occurs as a soft, unctuous, yellowish-white to yellowish-brown mass, having a characteristic odor and an alkaline taste.

ACTION AND USES: Soft soap is used principally as a detergent; being soluble in alcohol, and in mixtures of alcohol and water it is frequently used as a liquid soap. A convenient form is the "Tincture of Green Soap," Linimentum Saponis Mollis, U. S. P., an alcoholic solution containing about 65 per cent. of soft soap, flavored with oil of lavender. Soft soap is also used to some extent as a vehicle for other more active medicaments to be applied in the form of an ointment.

Scopolaminae Hydrobromidum (Scopolamin. Hydrobrom.), Scopolamin Hydrobromid, U. S. P. (Hyoscin Hydrobromid, Hyoscin Bromid).—The hydrobromid, $C_{17}H_{21}NO_4.HBr+3H_2O$, of an alkaloid (levorotatory scopolamin) obtained from plants of the *Solanaceae*.

PROPERTIES: Scopolamin hydrobromid forms colorless crystals, odorless, having, in dilute solutions, an acrid, slightly bitter taste, freely soluble in water (1: 1.5) and in alcohol (1: 20).

INCOMPATIBILITIES: Scopolamin hydrobromid is incompatible with alkalies and other precipitants of alkaloids.

ACTION AND USES: Scopolamin resembles atropin in its influence on the nerve endings, but differs from it in having a sedative instead of a stimulating effect on the brain. It

is used as a cerebral sedative in cases of mania and other forms of insanity, but must be employed with caution, as it sometimes induces a rapid fall in blood pressure and collapse. It has been extensively used in conjunction with morphin for the production of surgical anesthesia, either as a preliminary to the use of ether or chloroform, or as the operation anesthetic. In doses sufficiently large to produce anesthesia, however, it is likely to cause dangerous depression of the respiration. Experience in these methods of anesthesia has not been satisfactory. It has been employed as a partial anesthetic in labor, but the effect on the fetus is sometimes disastrous, many children being born dead or asphyxiated.

It is frequently used as a mydriatic and is regarded by some ophthalmologists as preferable to atropin because it is less irritating, and produces a brief and complete cycloplegia.

DOSAGE: 0.3 mg. or 1/200 grain.

Senna (Senn.), Senna, U. S. P.—The dried leaflets of *Cassia acutifolia* (Alexandria senna), or of *Cassia angustifolia* (India or Tinnevelly senna).

ACTION AND USES: Senna belongs to the anthraquinone-containing group of vegetable purgatives and is one of the most efficient drugs of this class. It is largely used for the treatment of chronic constipation.

DOSAGE: 4 Gm. or 1 dram, administered either as the powder, or as an infusion, or preferably in the form of one of its official preparations.

FLUIDEXTRACTUM SENNAE (FLDEXT. SENN.), FLUIDEXTRACT OF SENNA, U. S. P.—A hydro-alcoholic extract, 100 Cc. of which represent 100 Gm. of senna.

DOSAGE: 2 Cc. or 30 minims.

SYRUPUS SENNAE (SYR. SENN.), SYRUP OF SENNA, U. S. P.—Represents a mixture of fluidextract of senna (25 Cc.) with syrup (sufficient to make 100 Cc.).

DOSAGE: 4 Cc. or 1 fluidram. This is a pleasant preparation, readily taken by children.

PULVIS GLYCYRRHIZAE COMPOSITUS (PULV. GLYCYRRH. CO.), COMPOUND POWDER OF GLYCYRRHIZA, U. S. P. (Compound Licorice Powder).—A mixture of senna (18 Gm.), glycyrrhiza (23.6 Gm.), sulphur (8 Gm.), oil of fennel (0.4 Gm.), and sugar (50 Gm.).

ACTION AND USES: Pulvis Glycyrrhizae Compositus has been widely used as a laxative.

DOSAGE: 4 Gm. or 1 dram, administered mixed with a suitable liquid, preferably milk.

SERA ET VACCINA, SERUMS AND VACCINES.—The vaccines, viruses and serums constitute one of the most important groups of drugs with which the physician has to deal. Some preparations of this group are specific cures for certain diseases; others are invaluable in prophylaxis and diagnosis. The supervision of these drugs is in charge of the United States Public Health Service, which periodically makes inspections of laboratories licensed in accordance with the law passed by Congress in 1902. Antidiphtheric and antitetanic serums are required to conform strictly to the standards which have been established by the United States Public Health Service. There being no established standard for the various other products, they are not examined for their therapeutic value but are tested for the amount of preservative and freedom from bacterial and toxic contaminations. (See also **Vaccina.**)

Serum Antidiphthericum Purificatum (Ser. Antidiph. Purif.) Purified Antidiphtheric Serum, U. S. P. (Antidiphtheric Globulins, Concentrated Diphtheria Antitoxin, Diphtheric Antitoxin Globulins, Refined and Concentrated Diphtheria Antitoxin).—A solution in physiologic sodium chlorid solution of certain antitoxic substances obtained from the blood serum or plasma of the horse which has been properly immunized against diphtheria toxin. This product has the advantage of diminishing the incidence of serum disease.

PROPERTIES: Antidiphtheric serum occurs as a yellowish or yellowish-brown, transparent or slightly turbid liquid, nearly odorless or having a slight odor due to the presence of an antiseptic used as a preservative. The standard of strength, expressed in units of antitoxic power, must be that approved or established by the United States Public Health Service.

ACTION AND USES: Purified antidiphtheric serum neutralizes the toxin of diphtheria and is employed both as a curative and as a prophylactic agent in that disease. It is to be administered hypodermically.

DOSAGE: The dose of purified diphtheria antitoxin is measured by antitoxic units. Five hundred, or better, 1,000 units, are given as an immunizing or prophylactic dose. For curative treatment from 5,000 to 40,000 units should be given as an initial dose, according to the severity of the symptoms. Subsequent injections are much less effectual and usually are not required if a sufficient initial dose has been given. In urgent cases it may be given intravenously. If there is reason to fear hypersusceptibility to horse serum, 0.1 Cc. may be administered subcutaneously and the dose doubled hourly till the full dose is given.

Serum Antimeningococcicum (Ser. Antimening.), Antimeningococcus Serum.—A fluid separated from the coagulated blood of horses which have been properly immunized against antimeningococcus cultures.

for diplococcus intracellularis

PROPERTIES: Antimeningococcus serum occurs as a yellowish or yellowish-brown, slightly turbid liquid, odorless or having an odor due to the presence of the antiseptic used as preservative. There are no standards of potency and the rate of deterioration is not known.

ACTION AND USES: Effective as a curative agent.

DOSAGE: The serum is to be used only intrathecally, the usual procedure being to withdraw spinal fluid and introduce an equal amount or somewhat less of the serum. The dose varies; 5 Cc. may be considered the maximum safe dose for a young child and 30 Cc. for an adult. Serum should be continued so long as active symptoms remain.

Serum Antitetanicum Purificatum (Ser. Antitetan. Purif.), Purified Antitetanic Serum, U. S. P. (Antitetanic Globulins, Concentrated Tetanus Antitoxin, Refined and Concentrated Tetanus Antitoxin, Solution of Tetanus Antitoxic Globulin).—A solution in physiologic solution of sodium chlorid of certain antitoxic substances obtained from the blood serum or plasma of a horse which has been properly immunized against tetanus toxin.

PROPERTIES: Antitetanic serum occurs as a yellowish or yellowish-brown, transparent or slightly turbid liquid, odorless or having an odor due to the presence of the antiseptic used as a preservative. It gradually loses its potency, the loss being greater at higher than at lower temperatures. The standard of strength expressed in units of antitoxic power must be that approved or established by the United States Public Health Service.

ACTION AND USES: Effective as a prophylactic and of some value as a curative agent in tetanus.

DOSAGE: Immunizing dose, on day of wound and repeated weekly till healed: 1,500 units subcutaneously. In actual tetanus, 3,000 to 5,000 units, diluted with an equal volume of physiologic solution of sodium chlorid, intraspinally, and 10,000 units intravenously at the earliest possible moment; the intraspinal dose to be repeated daily until recovery is assured, and 10,000 units to be given subcutaneously on the fourth day.

Sinapis Nigra (Sinap. Nig.), Black Mustard, U. S. P. (Brown Mustard).—The seed of *Brassica nigra*.

ACTION AND USES: Mustard is used extensively as a counterirritant. When mustard is mixed with water, the volatile oil is generated by the action of a ferment, myrosin, on a principle called sinigrin, contained in black mustard.

DOSAGE: As an emetic, 8 Gm. or 120 grains, suspended in a liberal amount of water.

EMPLASTRUM SINAPIS (EMP. SINAP.), MUSTARD PLASTER, U. S. P. (Charta Sinapis, U. S. P., VIII, Mustard Paper). —A coating of black mustard on rather thick, well-sized paper, cotton cloth or other fabric, used in place of the

domestic mustard poultice. The latter has, however, the advantage that its strength may be modified according to the sensitiveness of the skin. While, for a man, it may be prepared by mixing equal parts of mustard and of flour, it is preferable to use twice as much flour for women and four times as much for children. Duration of application is from fifteen to thirty minutes.

Oleum Sinapis Volatile (Ol. Sinap. Vol.), Volatile Oil of Mustard, U. S. P. (Mustard Oil).—A volatile oil obtained from black mustard by maceration with water and subsequent distillation, yielding, when assayed by the process given in the U. S. Pharmacopeia, not less than 92 per cent. of allyl iso-thiocyanate.

Properties: Volatile oil of mustard occurs as a colorless or pale yellow, limpid liquid, having a very pungent and irritating odor. Great caution should be exercised when smelling this oil, and it should not be tasted without being highly diluted. It is miscible with alcohol in all proportions, and is generally soluble in liquids containing alcohol.

Action and Uses: See **Sinapis Nigra.**

Dosage: 0.008 Cc. or ⅛ minim. Rarely used internally; chiefly employed as counterirritant in liniments up to 3 per cent.

Sodii Benzoas (Sod. Benz.), Sodium Benzoate, U. S. P.—Contains not less than 99 per cent. of $NaC_7H_5O_2$.

Properties: Sodium benzoate occurs as a white, amorphous powder, odorless, and having a sweetish taste. It is freely soluble in water (1: 1.8) and soluble in alcohol (1: 61).

Incompatibilities: It is incompatible with mineral acids and with ferric salts.

Action and Uses: Sodium benzoate has an internal action similar to that of benzoic acid (*q. v.*).

Dosage: 1 Gm. or 15 grains. It is usually administered in the form of solution.

Sodii Bicarbonas (Sod. Bicarb.), Sodium Bicarbonate, U. S. P.—Contains not less than 99 per cent. of $NaHCO_3$.

Properties: Sodium bicarbonate occurs as a white, opaque powder, odorless and having a cooling, mildly alkaline taste. It is soluble in water (1: 10) at 15 C., practically without decomposition, but above this temperature the solution gradually loses carbon dioxid, and at the boiling point of water the salt is converted into normal carbonate; it is practically insoluble in alcohol.

Incompatibilities: Sodium bicarbonate is incompatible with acids and acid salts, and the solution should be made with cold water, which tends to prevent its conversion into the more alkaline carbonate.

Action and Uses: Sodium bicarbonate alone or in combination with bismuth subcarbonate or magnesia is used to neutralize the acid of the gastric juice in hyperacidity, acid dyspepsia, etc. It is used to render the urine alkaline in gravel, pyelitis, etc.

Large doses are given by the mouth in cases of acidosis in diabetes or from any other cause. Sodium bicarbonate may be used intravenously in cases of extreme acidosis. It should never be injected hypodermically or intramuscularly unless special precautions are observed, as it is very likely to cause sloughing. (See under Dosage.)

Externally it is used as a mild alkaline wash. Solutions of sodium bicarbonate are antipruritic. A solution is employed to soften impacted cerumen. Sodium bicarbonate may be employed to neutralize acetic or citric acids for the extemporaneous preparation of sodium acetate or citrate.

Dosage: 1 Gm. or 15 grains. Much larger doses may be given in acidosis. As much as 60 Gm. or 2 ounces may be given daily. It may be administered by a "drop enema" of a 4 per cent. solution. For intravenous injection a 6 per cent. solution sterilized by boiling and hence partly converted into the carbonate has been recommended. One thousand Cc. of such a solution may be injected, but great care must be taken that none of the liquid gets outside the vein lest necrosis of the tissues occur.

In certain exceptional cases where sodium bicarbonate cannot be given by mouth or intravenously it may be injected subcutaneously or intramuscularly in 3 or 4 per cent. strength. After thorough sterilization and cooling of the solution, carbon dioxid should be bubbled through the solution until it is colorless to phenolphthalein. The solution is then much less likely to cause necrosis.

Sodii Biphosphas (Sod. Biphos.), Sodium Acid Phosphate, N. N. R.—The monosodium dihydrogen salt, $NaH_2PO_4 + H_2O$, of orthophosphoric acid, H_3PO_4.

Properties: Sodium acid phosphate occurs as large, colorless, transparent crystals or a white, granular crystalline powder, odorless and having a cooling, saline and somewhat acid taste; slightly deliquescent. It is very soluble in water; insoluble in alcohol, ether and chloroform.

Action and Uses: Sodium acid phosphate undergoes no change in the stomach, but in the intestine is neutralized, by alkali drawn from the blood, into disodium hydrogen phosphate. The reduction of the alkalinity of the system which would otherwise result is prevented by the excretion of acid in the urine. Sodium acid phosphate thus renders the urine acid or increases its acidity, and is therefore used to assist the action of hexamethylenamin, which is effective only in acid urine. For this purpose the acid phosphate should be given long enough in advance so that it will have left the stomach before the hexamethylenamin enters it. In larger doses sodium acid phosphate produces laxative effects similar to those produced by the official disodium hydrogen phosphate (sodium phosphate, U. S. P.).

Dosage: From 1 to 1.5 Gm. (15 to 20 grains), in water, repeated every two or three hours, for five or ten doses, until the urine becomes acid. Sodium acid phosphate may

be administered in sweetened water like lemonade. It should not be prescribed in solution with hexamethylenamin.

NOTE: By the addition of 1 Cc. of dilute hydrochloric acid or 4 Cc. of dilute phosphoric acid to each gram of sodium phosphate (U. S. P.), the latter is converted into the acid phosphate and may be used to render the urine acid.

Sodii Boras (Sod. Bor.), Sodium Borate, U. S. P. (Borax. Sodium Tetraborate, Sodium Pyroborate).—Corresponds to not less than 99 per cent. of $Na_2B_4O_7+10H_2O$.

PROPERTIES: Sodium borate occurs as colorless, transparent crystals or a white powder, inodorous, and having a sweetish alkaline taste. It is soluble in water (1: 15), but practically insoluble in alcohol.

INCOMPATIBILITIES: Sodium borate is decomposed by mineral salts and is incompatible with mucilage of acacia, with the metallic salts of the mineral acids and with the salts of most alkaloids.

ACTION AND USES: Sodium borate is antiseptic, astringent and detergent and is used both externally and sometimes internally in the form of solution. The continuous ingestion of even small doses produces a deleterious effect. Moderate to large doses may cause nephritis. Very large doses cause gastro-enteritis, nephritis, skin eruptions, visual disturbances, fall of temperature, collapse and a widespread fatty degeneration. It is used in from 1 to 2 per cent. solution as an eye-wash in hyperemia of the conjunctiva and catarrhal conjunctivitis.

For this purpose the following formula is very serviceable:

℞ Sodii boratis ..... 0.5 Gm.
Aquae camphorae ..... 5.0 Cc.
Aquae destillatæ .....ad. 25.0 Cc.

It is sometimes used as an antipruritic solution:

℞ Sodii boratis ..... 1.0 Gm.
Glycerini ..... 0.6 Cc.
Aquae ..... 30.0 Cc.

It may be used as a gargle.

DOSAGE: 0.5 Gm. or 8 grains.

Sodii Bromidum (Sod. Brom.), Sodium Bromid, U. S. P.—Contains not less than 98.5 per cent. of NaBr.

PROPERTIES: Sodium bromid occurs as colorless or white, cubical crystals, or a white, granular powder, odorless, and having a saline, slightly bitter taste. It is freely soluble in water (1: 1) and soluble in alcohol (1: 16).

ACTION AND USES: Sodium bromid is used as a nerve sedative and cerebral depressant and in ordinary doses its action and uses are identical with those of potassium bromid, but it is probably less irritating to the stomach. See **Potassium Bromid.**

DOSAGE: 1 Gm. or 15 grains. It is preferably administered in dilute aqueous solution or in milk.

Sodii Cacodylas (Sod. Cacodyl.), Sodium Cacodylate, U. S. P.—Sodium dimethylarsenate, $Na(CH_3)_2AsO_2$, the sodium salt of cacodylic acid (dimethyl arsenic acid), with a somewhat variable amount of water of crystallization.

PROPERTIES: Sodium cacodylate occurs as white crystals or a granular powder, very soluble in water (1: 0.5) and in alcohol (1: 2.5). The aqueous solution is alkaline toward litmus paper, but nearly neutral toward phenolphthalein.

ACTION AND USES: The action of sodium cacodylate is similar to that of other arsenic compounds, but it is much less toxic than the ordinary preparations of arsenic and is also less apt to cause undesirable side effects. This superiority is due to the slow liberation of the arsenous acid in the body. Sodium cacodylate has been particularly recommended in pseudoleukemia, anemia, chlorosis, malarial cachexia, etc. It has been tried in syphilis but is inefficient even in large doses, which injure the kidneys. As it is sometimes decomposed in the stomach, imparting a garlic odor to the breath, it is preferable to give it hypodermically or intramuscularly.

DOSAGE: 0.03 to 0.06 Gm. or ½ to 1 grain, hypodermically or intramuscularly in aqueous solution; or by mouth in elixir or in the form of pills.

Sodii Carbonas Monohydratus (Sod. Carb. Monohyd.), Monohydrated Sodium Carbonate, U. S. P.—The form in which sodium carbonate is now official. Contains not less than 99.5 per cent. of $Na_2CO_3+H_2O$.

PROPERTIES: Monohydrated sodium carbonate occurs as a white, crystalline, granular powder, odorless and having a strongly alkaline taste. It is freely soluble in water (1: 3) and practically insoluble in alcohol. Sodium carbonate, as now official, contains but one molecule of water of crystallization, and is nearly twice as strong in alkaline power as the ordinary crystalline carbonate, $Na_2CO_3+10H_2O$, commonly known as "sal soda."

INCOMPATIBILITIES: Sodium carbonate is incompatible with acids and acid salts and with the salts of the heavy metals and of alkaloids.

ACTION AND USES: Sodium carbonate is a fairly corrosive alkali. It is employed in medicine chiefly in the preparation of alkaline baths. For this purpose it may be used in the proportion of from 2 to 6 ounces for 30 gallons of water.

DOSAGE: 0.25 Gm. or 4 grains, in dilute solution.

Sodii Chloridum (Sod. Chlorid.), Sodium Chlorid, U. S. P. (Common Salt).—Contains not less than 99 per cent. of NaCl.

Properties: Sodium chlorid occurs as colorless, cubical crystals or as a white crystalline powder, odorless and having a purely saline taste. It is freely soluble in water (1: 2.8) and nearly insoluble in alcohol.

Incompatibilities: Sodium chlorid is incompatible with salts of silver and lead.

Action and Uses: Sodium chlorid is used for preparing physiologic solution of sodium chlorid: 8.5 Gm. to 1,000 Cc. of sterile water (Liquor Sodii Chloridi Physiologicus, U. S. P.). This solution is frequently referred to as normal salt solution, but should not be confused with the chemical normal solution of sodium chlorid. When given by mouth in large doses sodium chlorid are emetic, and, in proper dilution, laxative.

Dosage: As an emetic, 15 Gm. or 4 drams. As a laxative it is given in 1 per cent. solution. The dose, 4 Gm. or 60 grains, should be dissolved in from 0.25 to 0.5 liter (from ½ to 1 pint) of water and drunk on an empty stomach.

Sodii Hydroxidum (Sod. Hydrox.), Sodium Hydroxid, U. S. P. (Caustic Soda, Sodium Hydrate).—Contains not less than 90 per cent. of NaOH.

Properties: Sodium hydroxid occurs as dry, white or nearly white flakes, fused masses or hard and brittle sticks, showing a crystalline fracture; odorless, and, in dilute solutions, having a caustic taste. Great caution is necessary in tasting and handling it, as it rapidly destroys organic tissue. It is very soluble in water (1: 0.9) and in alcohol.

Action and Uses: Sodium hydroxid has properties closely resembling those of potassium hydroxid. It is used chiefly for pharmaceutical purposes, though occasionally it is applied locally as a caustic or in dilute solution as an alkaline wash. Solution of sodium hydroxid largely diluted has also been administered internally.

Liquor Sodii Hydroxidi (Liq. Sod. Hydrox.), Solution of Sodium Hydroxid, U. S. P. (Liquor Sodae, Solution of Soda).—An aqueous solution containing not less than 4.5 per cent. of sodium hydroxid, NaOH.

Dosage: 1 Cc. or 15 minims, well diluted.

Sodii Iodidum (Sod. Iod.), Sodium Iodid, U. S. P.—NaI.

Properties: Sodium iodid occurs as colorless, cubical crystals, or as a white, crystalline powder, odorless and having a saline and slightly bitter taste. It is very soluble in water (1: 0.5) and freely soluble in alcohol (1: 3).

Incompatibilities: Sodium iodid is incompatible with spirit of nitrous ether, bismuth salts, ferric salts, and the salts of many alkaloids.

Action and Uses: Sodium iodid has properties closely resembling those of potassium iodid, and like sodium bromid is perhaps less irritating than the potassium salt. It is used in small doses to prevent simple goiter in "goitrous" regions.

DOSAGE: Average, 0.5 Gm. or 8 grains. For ordinary cases the dose may range from 0.3 to 1.25 Gm. or from 5 to 20 grains. When employed for the energetic treatment of tertiary syphilis it is sometimes necessary to increase the dose to from 2 to 5 Gm. or from 30 to 75 grains or more. It should not be given on an empty stomach but should be administered after meals, freely diluted with liquid, preferably milk. For prevention of simple goiter, 2 grams may be given in 0.2 Gm. doses (either solid, or in solution) for ten consecutive school days, repeated twice yearly. Sodium or potassium iodid, 1 Gm., mixed with 1 Kg. of table salt to be used as condiment for food will serve as a means of supplying an adequate amount of iodin for prophylactic purposes.

Sodii Nitris (Sod. Nitris), Sodium Nitrite, U. S. P.—Contains not less than 95 per cent. of $NaNO_2$.

PROPERTIES: Sodium nitrite occurs as white, or nearly white, opaque, fused masses or sticks or as colorless, transparent crystals which are odorless and have a mild saline taste. It is freely soluble in water (1: 1.5) and very slightly soluble in alcohol.

INCOMPATIBILITIES: It is incompatible with oxidizing agents generally. It must be protected from contact with the air on account of its tendency to oxidation.

ACTION AND USES: Sodium nitrite has the characteristic properties of the nitrites, and resembles nitroglycerin in its action, though its effect is manifested more slowly and is somewhat more lasting. It sometimes produces gastric disturbance.

DOSAGE: 0.06 Gm. or 1 grain. It should be administered in solution.

Sodii Phosphas (Sod. Phos.), Sodium Phosphate, U. S. P.—Contains not less than 99 per cent. of $Na_2HPO_4+12H_2O$.

PROPERTIES: Sodium phosphate occurs as large, colorless, monoclinic prisms, or a granular, crystalline salt, odorless, and having a cooling saline taste. It is freely soluble in water (1: 5.5), but practically insoluble in alcohol.

ACTION AND USES: Sodium phosphate is used as a saline cathartic. Its mode of action has much in common with magnesium sulphate and sodium sulphate. Its taste is less disagreeable, but it is also less active.

DOSAGE: 2 Gm. or 30 grains dissolved in warm water.

It may also be administered in liquid form by adding 4 parts of sodium nitrate, 13 parts of citric acid and a little water to 100 parts of sodium phosphate.

SODII PHOSPHAS EFFERVESCENS (SOD. PHOS. EFF.), EFFERVESCENT SODIUM PHOSPHATE, U. S. P.—A mixture of exsiccated sodium phosphate, sodium bicarbonate, tar-

taric acid and citric acid, representing approximately 50 per cent. of sodium phosphate as described above.

DOSAGE: 10 Gm. or 2½ drams.

Sodii Salicylas (Sod. Salicyl.), Sodium Salicylate, U. S. P.— Contains not less than 99.5 per cent. of $NaC_7H_5O_3$.

PROPERTIES: Sodium salicylate occurs as white microcrystalline powder or scales, or as an amorphous, white powder, having not more than a faint pink tinge, odorless, and having a sweet saline taste. It is very soluble in water (1: 0.9) and freely soluble in alcohol (1: 9.2).

INCOMPATIBILITIES: Sodium salicylate is incompatible with acids and acid salts and with solutions of most alkaloids, notably quinin, which precipitates as the salicylate. It gives a violet color to iron salts.

ACTION AND USES: Sodium salicylate is the salt which is usually employed to secure the constitutional effects of salicylic acid. It is an analgesic and antipyretic. It is sometimes administered for the relief of headache or of neuralgic pains, but is chiefly used for its effect in articular rheumatism in which it is highly efficacious. It promptly relieves all the local joint symptoms and the fever, but does not affect the endocarditis. Its effects last only while the medication is kept up. It is useful in tonsillitis and other catarrhal inflammations, but has not the decided action in the ordinary infections that it has in rheumatic fever. It is used in chorea. It is of no value in gonorrheal arthritis and arthritis deformans, and of little value in gout. It is useful in some forms of eye diseases, such as iritis, keratitis or glaucoma. It is slightly antiseptic, but not so much so as the free acid. It is irritant to mucous membranes and may cause pain and even vomiting when large doses are administered on an empty stomach. Large therapeutic doses produce a ringing in the ears, nausea, sometimes vomiting, occasional sweating and an increase in the amount of urine. It increases nitrogenous metabolism, and an increased amount of uric acid is excreted in the urine. It stimulates the secretion of bile. In very large doses it may produce depression of the central nervous system, rarely convulsions, a slowing and depression of the respiration, and collapse from depression of circulation. Large doses may produce abortion, and hence the drug is contraindicated in pregnancy.

DOSAGE: 1 Gm. or 15 grains. The more efficient method is to repeat this dose every hour until salicylism occurs and then three times daily. It is well to combine it with alkali, such as sodium bicarbonate, so as to prevent its precipitation in the form of salicylic acid by the hydrochloric acid of the stomach. It should be given well diluted in simple solution, but is sometimes administered in the form of powder inclosed in capsules or cachets, and followed by a sufficient amount of water to dilute it well in the stomach.

Sodii Sulphas (Sod. Sulph.), Sodium Sulphate, U. S. P. (Glauber's Salt).—Contains not less than 99 per cent. of $Na_2SO_4+10H_2O$.

PROPERTIES: Sodium sulphate occurs as large, colorless prisms or granular crystals, odorless and having a bitter saline taste. It is freely soluble in water (1: 2) and practically insoluble in alcohol.

ACTION AND USES: Sodium sulphate is used as a saline cathartic, but is less popular than magnesium sulphate or sodium phosphate.

DOSAGE: 15 Gm. or 4 drams.

Sodii Thiosulphas (Sod. Thiosulph.), Sodium Thiosulphate, U. S. P. (Sodium Hyposulphite).—Contains not less than 99 per cent. of $Na_2S_2O_3+5H_2O$.

PROPERTIES: Sodium thiosulphate occurs as colorless, transparent monoclinic prisms, odorless and having a cooling, afterward bitter taste. It is very soluble in water (1: 0.5) and practically insoluble in alcohol.

INCOMPATIBILITIES: Sodium thiosulphate is incompatible with acids, iodin and chlorin. It dissolves insoluble salts of silver.

ACTION AND USES: Sodium thiosulphate is used externally, in the form of lotion, as an application for ringworm and other parasitic skin diseases. It may be used to remove stains of iodin or silver nitrate. Taken internally, it is cathartic.

DOSAGE: 1 Gm. or 15 grains. Externally, it is used in aqueous solution or ointment of 10 per cent. strength or 1 dram to the ounce.

Stramonium (Stramon.), Stramonium, U. S. P. (Jamestown Weed, Jimson Weed).—The dried leaves of *Datura stramonium* or of *Datura tabula*. Its constituents and action are similar to those of belladonna. Now seldom used in medicine except as an ingredient in so-called asthma powder for smoking which may be prepared from ground or granulated leaves to which is added one-eighth to one-fourth its weight of potassium nitrate.

Strophanthinum (Strophanthin.), Strophanthin, U. S. P.—A glucosid, or mixture of glucosids, obtained from strophanthus.

PROPERTIES: Strophanthin occurs as a white or faintly yellowish powder, having an intensely bitter taste. Because of its toxicity great caution should be used in tasting it. It is very soluble in water and in diluted alcohol, but less soluble in absolute alcohol.

ACTION AND USES: The effects of strophanthin are practically identical with those of digitalis. It is not readily absorbed from the gastro-intestinal tract; hence its oral use is not recommended. When injected intravenously or

intramuscularly, however, its action is much more prompt. It therefore deserves preference in emergencies. It is also excreted more rapidly, so that there is less danger of cumulative action.

DOSAGE: 0.3 mg. or 1/200 grain. It is best administered intramuscularly or intravenously, only a single dose being given daily, as a rule.

The commercial strophanthins often contain varying amounts of ouabain (g-strophanthin or crystallized strophanthin), which is more active than the amorphous strophanthin. Caution should be exercised in using these preparations, especially in passing from the use of one preparation to that of another, and especial caution should be exercised if the patient has had other digitaloids previously.

Strophanthus (Strophanth.), Strophanthus, U. S. P.—The ripe seed of *Strophanthus kombé* or of *Strophanthus hispidus.*

ACTION AND USES: Strophanthus and tincture of strophanthus have properties similar to those of the glucosid strophanthin, though the therapeutic results from the administration of strophanthus by mouth are more variable than the results obtained from the hypodermic or intravenous administration of strophanthin. It is doubtful if it has any advantages over the tincture of digitalis.

TINCTURA STROPHANTHI (TR. STROPHANTH.), TINCTURE OF STROPHANTHUS, U. S. P.—One hundred Cc. represent 10 Gm. strophanthus in approximately 92 per cent. of alcohol. It is nearly identical with the international standard tincture of strophanthus. If assayed biologically, the minimum lethal dose of tincture of strophanthus is not greater than 0.00006 Cc. for each gram of body weight of the frog.

DOSAGE: 0.5 Cc. or 8 minims, 3 times daily after meals. The undiluted tincture is best prescribed to be taken in drop dosage, or else an alcoholic vehicle should be chosen. Not only is the tincture pharmaceutically incompatible with water, but aqueous solutions undergo rapid decomposition. For intramuscular or intravenous injection a much smaller dose should be given, not more than 0.12 Cc. or 2 minims, as a rule.

Strychninae Nitras (Strych. Nit.), Strychnin Nitrate, U. S. P.—The nitrate $C_{21}H_{22}O_2N_2.HNO_3$, of the alkaloid strychnin.

PROPERTIES: Strychnin nitrate occurs as colorless, needle-shaped crystals, odorless, and having an intensely bitter taste. It is permanent in air, soluble in water (1: 42) and slightly soluble in alcohol (1: 150).

ACTION AND USES: See **Strychninae Sulphas.**

DOSAGE: 0.0015 Gm. or 1/40 grain.

Strychninae Sulphas (Strych. Sulph.), Strychnin Sulphate, U. S. P.—The sulphate $(C_{21}H_{22}O_2N_2)_2 \cdot H_2SO_4 + 5H_2O$, of the alkaloid strychnin.

PROPERTIES: Strychnin sulphate occurs as colorless or white prismatic crystals, or a white crystalline powder, odorless, and having an intensely bitter taste. It is efflorescent in dry air, soluble in water (1: 32) and in alcohol (1: 81).

DOSAGE: 0.0015 Gm. or 1/40 grain.

INCOMPATIBILITIES: The salts of strychnin are incompatible with alkalies, alkali carbonates, iodids, bromids, arsenates and arsenites.

ACTION AND USES: Strychnin stimulates the reflex activity of the spinal cord, but produces little or no effect on the higher nervous centers. Large doses raise the blood-pressure by stimulating the vasoconstrictor center. It seems to have little direct effect on the heart. It stimulates the respiratory center, increasing the rapidity of the respirations. In poisonous doses it produces tonic convulsions similar to those of tetanus, but the trismus is less marked. Between the attacks there is usually complete relaxation of the affected muscles. The convulsions are spinal, but not cerebral in origin. Death may occur, during a convulsion, from fixation of the chest by spasm of the respiratory muscles or during the interval from medullary paralysis. Strychnin is used as a bitter tonic, generally in form of a preparation of nux vomica. It is also a tonic to the muscular system. It has been widely used as a respiratory and circulatory stimulant in pneumonia and other infections, shock, etc., but careful observations have shown that nontoxic doses are ineffective. Strychnin is serviceable in some forms of paralysis. It is of no value when the paralysis results from an organic lesion and should not be employed in conditions of inflammation of the nerve centers. It may be given in paralysis due to poisons, such as lead, and in postdiphtheric paralysis. It is also of value in paralysis due to cortical lesions, if used in moderate doses, to improve the tone and with it the nutrition of the paralyzed muscles. In incontinence of urine, due to paresis of the vesical sphincter, it is useful, but if the incontinence depends on spasm, atropin is more serviceable. Strychnin is useful in amblyopia, acting best in disturbance of vision unattended by changes visible with the ophthalmoscope, especially hysteric and neurasthenic forms. In lesions of the optic nerve it frequently produces an improvement in vision, which, however, is only temporary. It is used in acute and chronic alcoholism. It is added to cathartics in the treatment of chronic constipation, but probably with little if any advantage.

DOSAGE: From 0.0005 Gm. (0.5 mg.) to 0.005 Gm. or from 1/120 to 1/12 grain, 3 times a day or, in the case of the smaller doses, as often as once in three hours.

Sulphonethylmethanum (Sulphonethylmeth.), Sulphonethylmethane, U. S. P. (Trional).—Diethylsulphone methyl ethyl methane, $(CH_3)(C_2H_5)C(SO_2C_2H_5)_2$.

PROPERTIES: Sulphonethylmethane occurs as colorless, odorless, crystalline scales, which have a bitter taste in aqueous solution. It is slightly soluble in water (1: 200) and freely soluble in alcohol.

ACTION AND USES: Sulphonethylmethane is a hypnotic, producing, in ordinary doses, no other symptoms than sleep. The sleep comes on in about an hour after the medicine is taken. In some cases the sleep is not secured until the next day.

Sulphonethylmethane, when repeatedly taken, may produce poisoning in which hematoporphyrin appears in the urine, giving it a pinkish tinge or red color. The continued use of the remedy may lead to the formation of a habit. In addition to the excretion of hematoporphyrin in the urine there are lassitude, weakness, nausea and gastrointestinal disturbance as shown by diarrhea and constipation. More serious symptoms then develop, including abdominal tenderness, violent vomiting, ataxia, paresis of various muscles, loss of reflexes, and finally a condition of profound collapse. This condition ends in death in about 75 per cent. of the cases. There is a nephritis which involves the glomeruli and may be hemorrhagic in character.

Sulphonethylmethane is of little use when the insomnia is accompanied by severe pain. It has been recommended also as an antispasmodic in epilepsy, hiccup, chorea, etc.

DOSAGE: 0.75 Gm. or 12 grains. Owing to its sparing solubility, it should be given with large quantities of hot liquids. It should not be used for more than two or three days consecutively. After this time recourse should be had to other hypnotics, if necessary. The appearance of hematoporphyrin, as indicated by pink color in the urine, should be watched for and the remedy suspended on its occurrence, but it is then often too late. It may be effectively given with barbital (aa 0.3 Gm.) to secure a continuous sleep for the entire night.

Sulphonmethanum (Sulphonmeth.), Sulphonmethane, U. S. P. (Sulphonal).—Diethylsulphone dimethyl methane, $(CH_3)_2C(SO_2C_2H_5)_2$.

PROPERTIES: Sulphonmethane occurs as colorless, inodorous and nearly tasteless crystals or a crystalline powder, slightly soluble in water (1: 365), but soluble in alcohol (1: 60).

ACTION AND USES: Sulphonmethane, or sulphonal, is hypnotic and sedative, similar to Sulphonethylmethane, which see. It has the same dangers and drawbacks. It acts more slowly than sulphonethylmethane and is best given about 5 p. m.

DOSAGE: 0.75 Gm. or 12 grains, given in a hot liquid.

Sulphur, Sulphur.—Official in the U. S. Pharmacopeia under three headings:

SULPHUR LOTUM (SULPH. LOT.), WASHED SULPHUR, U. S. P.

SULPHUR PRAECIPITATUM (SULPH. PRAEC.), PRECIPITATED SULPHUR, U. S. P.

SULPHUR SUBLIMATUM (SULPH. SUBLIM.), SUBLIMED SULPHUR, U. S. P.

PROPERTIES: Sulphur in any of the foregoing forms should contain not less than 99.5 per cent. of pure sulphur. Sulphur occurs as a fine yellow powder, the sublimed variety having a slight odor and a faintly acid taste. The other varieties are without odor or taste and all are practically insoluble in water or in alcohol.

ACTION AND USES: Sulphur becomes active in the intestines and on the skin by a partial conversion into hydrogen sulphid or other sulphids. These products are antiseptic and irritant. By undergoing such conversion in the intestines, sulphur becomes a mild purgative. Sulphur is employed externally as a parasiticide against scabies; and in seborrheal conditions. It is also used to produce sulphur dioxid for room disinfection, especially against insect-borne diseases, such as yellow fever or malaria, by burning it in the proportion of 3 pounds of sulphur to each 1,000 cubic feet of air space. All surfaces and articles to be disinfected should be wet.

DOSAGE: Each form, 4 Gm. or 60 grains, as laxative.

UNGUENTUM SULPHURIS (UNG. SULPHUR.), SULPHUR OINTMENT, U. S. P.—A mixture of washed sulphur (15 Gm.) with benzoinated lard (85 Gm.). When applied to the face, it may be diluted with five parts of an ointment base.

Terebinthina (Terebinth.), Turpentine, N. F.—A concrete oleoresin obtained from *Pinus palustris*. The source of:

OLEUM TEREBINTHINAE (OL. TEREB.), OIL OF TURPENTINE, U. S. P. (Turpentine Oil, "Spirits of Turpentine").—A volatile oil recently distilled from turpentine. Official in the Pharmacopeia also under the title Oleum Terebinthinae Rectificatus (Ol. Tereb. Rect.), Rectified Oil of Turpentine, U. S. P.

PROPERTIES: Oil of turpentine occurs as a thin colorless liquid, having a characteristic odor and taste, both of which become stronger and less pleasant by age and exposure to air. Oil of turpentine is practically insoluble in water, but freely soluble in alcohol (1:3), and in all proportions of oil.

ACTION AND USES: Oil of turpentine is antiseptic, anthelmintic and diuretic. Only the rectified oil should be used internally. Applied externally it is rubefacient and counter-irritant.

Oil of turpentine has been used as an expectorant in cases of bronchitis characterized by free secretion. For this purpose it is now generally replaced by terpin hydrate. It is also given for the relief of flatulence and a small amount (from ½ to 1 teaspoonful emulsified by means of yolk of egg) may be added to enemas to increase their effectiveness. Applied as a stupe over the abdomen it is used to relieve tympanites.

Oil of turpentine has been thought to be efficient in cases of internal hemorrhages, but this opinion is not well founded.

DOSAGE: 0.3 Cc. or 5 minims (rectified oil). It may be administered in the form of emulsion or in capsules.

Terpini Hydras (Terpin. Hyd.), Terpin Hydrate, U. S. P.—The hydrate, $C_{10}H_{18}(OH)_2+H_2O$, of the diatomic alcohol terpin.

PROPERTIES: Terpin hydrate occurs as colorless, lustrous, rhombic prisms, nearly odorless, and having a slightly aromatic and somewhat bitter taste. It is slightly soluble in water (1: 200) and freely soluble in alcohol (1: 13).

ACTION AND USES: Terpin hydrate has some antiseptic, diaphoretic and diuretic properties, but it is chiefly used as an expectorant in bronchitis accompanied by free secretion.

DOSAGE: 0.125 Gm. or 2 grains. Terpin hydrate may be administered in the form of powder or in capsules. As a solution, usually in the form of elixir, it requires an excessive amount of alcohol.

Theobromina (Theobrom.), Theobromin, N. N. R.—3,7-dimethyl-xanthin, a base occurring in *Theobroma cacao*, and also made synthetically. It is closely related to caffein (1,3,7-trimethyl-xanthin).

PROPERTIES: Theobromin occurs as a white, crystalline powder, odorless, and having a bitter taste. It is very slightly soluble in water, but is soluble in alcohol (1: 100).

ACTION AND USES: Theobromin has actions on the kidneys and heart similar to those of caffein, but its effect on the central nervous system is less marked. The relative freedom from side actions constitutes an advantage over caffein. Theobromin is employed as a diuretic in all forms of dropsy. It is nonirritating to the kidney. Because of its slight water-solubility, it is used in form of theobromin sodium salicylate.

DOSAGE: 0.3 Gm. or 5 grains.

THEOBROMINAE SODIO-SALICYAS (THEOBROM. SODIO-SAL.), THEOBROMIN SODIUM SALICYLATE, U. S. P. (Diuretin).—A double salt of theobromin-sodium and sodium salicylate in approximately molecular proportions.

PROPERTIES: Theobromin sodium salicylate contains 50 per cent. of theobromin and occurs as a white powder, odorless and having a

saline taste. It is freely soluble in water (1: 1), but is readily decomposed on exposure to carbon dioxid or by the action of acids, and must therefore be preserved in well-stoppered bottles.

INCOMPATIBILITIES: Theobromin sodium salicylate is incompatible with acids and has the other incompatibilities of salicylates.

DOSAGE: 1 Gm. or 15 grains, three times a day.

Theophyllina (Theophyll.), Theophyllin, U. S. P.—A feebly basic alkaloid, isomeric with theobromin. It is found in small amounts in the leaves of *Thea sinensis,* and is also prepared synthetically.

PROPERTIES: Theophyllin is dimethylxanthin. It occurs as a white, crystalline powder; odorless and having a bitter taste. It is slightly soluble in water (1: 100) and in alcohol (1: 80); it is permanent in the air.

ACTION AND USES: Theophyllin is used in cardiac affections, edemas, nephritis, etc. It has a diuretic action similar to that of caffein or theobromin, but is more powerful, and often succeeds where the other agents fail. However, the diuretic response is not as lasting; for this reason, it is advisable to replace it after two or three days by theobromin. Theophyllin may produce gastric and perhaps renal irritation.

DOSAGE: 0.2 to 0.35 Gm. or 3 to 5 grains, three times daily in hot tea.

Thymol, Thymol, U. S. P.—A phenol, $C_6H_3(CH_3)(OH)(C_3H_7)$, 1:3:4, occurring in the volatile oil of *Thymus vulgaris* and in some other volatile oils.

PROPERTIES: Thymol occurs as large, colorless prisms, having an aromatic, thyme-like odor, and a pungent, aromatic taste. It is only very slightly soluble in water (1: 1,010), but freely soluble in alcohol (1: 1).

ACTION AND USES: Thymol is antiseptic and anthelmintic. As an anthelmintic it is used chiefly for the destruction of hookworm.

DOSAGE: As intestinal antiseptic, 0.125 Gm. or 2 grains; as anthelmintic, 2 Gm. or 30 grains, with the usual modifications for age. It is administered in fine powder, in capsules of 0.3 Gm., preceded and followed by a saline cathartic. As a mouth wash, a saturated watery solution may be used. No fats, oils or alcohols should be given at the same time as thymol, for fear of facilitating the absorption of the drug.

Thymolis Iodidum (Thymol. Iod.), Thymol Iodid, U. S. P. (Aristol). — Dithymol-di-iodid, $(C_6H_2.CH_3.C_3H_7.OI)_2$, obtained by the condensation of two molecules of thymol and the introduction of two atoms of iodin into the phenolic groups of the thymol.

PROPERTIES: Thymol iodid contains, when dried over sulphuric acid, not less than 43 per cent. of iodin. It occurs as a bright, chocolate-colored, or reddish-yellow, bulky powder, with a very slight aromatic odor. It is practically insoluble in water and nearly insoluble in alcohol.

ACTION AND USES: Thymol iodid, is antiseptic and is used in place of iodoform, chiefly as a dusting-powder.

Thyroideum Siccum (Thyroid. Sicc.), Dried Thyroids, U. S. P. (Glandulae Thyroideae Siccae, U. S. P. VIII, Desiccated Thyroid Glands). The thyroid glands of animals which are used for food by man, freed from fat, and cleaned, dried and powdered.

PROPERTIES: Dried thyroids is a yellowish, amorphous powder, having a slight, characteristic odor, and containing the active constituent of the thyroid tissue. It is partially soluble in water. The preparation should be standardized to contain about 0.2 per cent. of iodin in organic combination.

ACTION AND USES: Dried thyroid gland acts chiefly through a compound of iodin contained in it. Therapeutically active doses increase destructive metabolism, as indicated by loss of body weight and increase of urine-nitrogen, carbon dioxid production and oxygen assimilation. The loss of weight is at first due mainly to loss of water; later to increased catabolism of adipose tissue, although there is also an increased breaking down of protein unless the diet contains an abundance of protein. With larger, or long-continued doses there is a very rapid action of the heart, nervousness, tremors, headache, flushing of the surface, sweating and much more pronounced loss of weight.

Thyroid gland is of service in cases marked by deficient action of the gland. The most striking results are obtained in cretinism and myxedema and in the condition known as cachexia thyreopriva, due to the removal of the thyroid gland. The beneficial effects are seen in the improved condition of the skin, the reestablishment of perspiration and of a normal temperature, increased diuresis and loss of weight, improvement in the mental condition and, in young subjects, renewed growth, especially of the long bones and of the hair. In many cases after the more severe symptoms of hypothyroidism have disappeared, remarkably small doses suffice to keep the patient in an almost normal state; it is often necessary, however, to continue such small doses indefinitely.

Thyroid is efficacious in many cases of milder degrees of hypothyroidism; but these are often difficult to diagnose.

In some forms of goiter the function of the thyroid is defective and the administration of the dried gland is indicated; but in most cases of goiter its use is condemned. Thyroid has been much used in obesity, but it is indicated in only a small proportion of cases and it should be given in moderate amounts so as not to do harm by the destruction of proteins. The effects, which are marked at first, are not permanent.

DOSAGE: 0.06 Gm. or 1 grain should be given as the initial dose three times daily, increasing gradually until improvement is noted; its administration should be discontinued if toxic symptoms appear. The patient should be careful of exertion and should take sufficient protein in his diet to compensate for increased loss of nitrogen from the action of the drug. The remedy may be given in powder, cachets or capsules. A dose of 0.6 Gm. or 10 grains a day should rarely be exceeded. For accurate dosage thyroxin, an active compound obtained from thyroid, is often preferable (see N. N. R.).

Thyroxin —

Tragacantha (Trag.), Tragacanth, U. S. P. (Gum Tragacanth).—A gummy exudation from *Astragalus gummifer.*

ACTION AND USES: Tragacanth swells on addition of water and gradually forms a cloudy gelatinous mass. On further addition of water it forms a mucilage which is occasionally used in pharmacy in the making of emulsions and is widely used as a basis for a greaseless catheter lubricant and an application for chapped skin.

Trinitrophenol (Trinitrophen.), Trinitrophenol, U. S. P. (Acidum Picricum, Picric Acid).—$C_6H_2OH(NO_2)_3$ (1:2:4:6). An acid obtained by nitrating phenol.

PROPERTIES: Trinitrophenol occurs as pale, yellow prisms, odorless and having a very bitter taste. It is explosive when heated rapidly or when subject to percussion. It is soluble in cold water (1:78), imparting a yellow color to a very large volume, more soluble in water at higher temperatures (1:25 at 80 C.), easily soluble in alcohol (1:12).

CAUTION: For safety in transportation it is usually mixed with 20 per cent. of water.

ACTION AND USES: Picric acid is an irritant, astringent and antiseptic to the skin and mucous membranes. It is used mainly for the treatment of superficial burns, but its application produces severe though temporary smarting. Its use on large areas also presents some danger of systemic poisoning. It has been largely displaced by the paraffin treatment. Taken internally, it may produce nausea, vomiting and diarrhea. The urine is colored red or yellow and may show signs of nephritis. The skin and mucous membranes may be stained yellow and thus jaundice may be simulated. Red blood cells are partly dissolved and the white cells are increased in number.

DOSAGE: The internal dose is stated as from 0.03 to 0.1 Gm. (½ to 1½ grains). For use on burns, cloths moistened with the saturated watery solution are applied to the properly cleansed burned area. Over this is placed a pad of dry absorbent cotton which is fastened by a light bandage. The dressing rapidly dries and may be left in place for several days.

Tuberculinum, Tuberculin, N. N. R.—This represents the products of growth of the tubercle bacillus.

PROPERTIES: Tuberculin is marketed in a variety of forms, either as a filtered extract of the bacilli or as the pulverized insoluble substance of the dead bacilli themselves. In the latter or emulsified form tuberculin is known as tubercle vaccine, and it is closely related to bacterial vaccines mentioned under Vaccina.

ACTION AND USES: Tuberculin is used principally as a diagnostic agent and the characteristic properties of the trade product to be used should be studied closely before it is employed.

VACCINA, BACTERIAL VACCINES, N. N. R.—Bacterial vaccines are suspensions of the killed bacteria in physiologic solution of sodium chlorid. Cresol is usually added as a preservative.

Bacterial vaccines are used to secure the production of an active immunity. Great care and skill are necessary for their proper use, and no definite statements as to dosage, etc., can be given.

The use of most of these vaccines is in the experimental stage. They are often prepared from cultures obtained from the individual to be treated (autogenous vaccines); these usually give the best results, and some authors maintain that "stock" vaccines should be used only when it is impracticable to secure the autogenous agent. (See also Sera et Vaccina.)

Vaccinum Rabies, Antirabic Vaccine, N. N. R.—The virus of rabies rendered practically nonvirulent for man by passage through a long series of rabbits and treated in various ways to decrease the infectivity still further, or by the addition of chemicals to destroy entirely.

PROPERTIES: The method of preparing the vaccine commonly used s that of Pasteur, with modifications. Essentially it is this: The spinal cords of the infected rabbits are dried over sodium hydroxid at constant temperature for from one to eight days, then cut in 0.5 centimeter pieces and prescrved in glycerin. For use, the cord is emulsified in physiologic solution of sodium chlorid.

ACTION AND USES: After the bite of a rabid animal, treatment with antirabic vaccine (if not too long delayed) usually establishes immunity before the incubation period of the disease is completed, thus preventing rabies. The treatment fails occasionally and in a small percentage of cases it is followed by paralysis, which is usually transient but may be fatal.

DOSAGE: The dosage varies with the method of preparation. Each dose is supplied in a single container and is injected into the subcutaneous tissue, usually of the anterior abdominal wall. In mild bites of the extremities or through the clothing, a series of fourteen injections on successive days is usually given, while in severe wounds of the face or trunk, the series consists of twenty-one daily injections.

Vaccinum Staphylococcicum (Vac. Staphylococ.), Staphylococcus Vaccine, N. N. R.—A vaccine made from the *Staphylococcus pyogenes aureus,* from the *Staphylococcus pyogenes albus,* or from the *Staphylococcus pyogenes citreus,* or from all three.

ACTION AND USES: Staphylococcus vaccine is thought to be useful in carbunculosis, furunculosis, sycosis, and certain cases of acne. An autogenous vaccine should be used by preference. The forms of acne most likely to respond are characterized by deep-seated pustules, with considerable induration, situated on the face, chest and back. When the lesions are superficial and indolent, the acne vaccines give good results, and when there is a mixture of active and indolent lesions, a mixture of the two vaccines is indicated.

Vaccinum Typhosum (Vac. Typhos.), Typhoid Vaccine, N. N. R.—A vaccine made from *Bacillus typhosus.* In some cases *Bacillus paratyphosus* A and *Bacillus paratyphosus* B are also used.

ACTION AND USES: Typhoid vaccine is of recognized utility in the prevention of typhoid fever. The immunity probably persists in the majority of cases from two to four years or longer. The vaccine may be of service also in the treatment of typhoid carriers. In such cases an autogenous vaccine is to be preferred. The same is true in the bacterial complications and sequelae of typhoid fever, especially those that appear during convalescence or are prolonged into that stage.

The use of vaccine in the treatment of typhoid fever has given very inconclusive results. No positive evidence of harm resulting from its use has been recorded. Many clinicians, however, believe that the giving of an additional amount of the toxin of the disease may turn the balance against recovery in states characterized by marked toxemia.

DOSAGE: As a preventive, typhoid vaccine should be administered only to healthy persons. The skin should be sterilized with iodin and an initial dose of 500,000,000 bacteria injected aseptically. This injection should be followed in from seven to ten days by a second dose of 1,000,000,000 bacteria; a third injection of the same size is given seven to ten days after the second.

Valeriana (Valer.), Valerian, U. S. P.—The dried rhizome and roots of *Valeriana officinalis.*

ACTION AND USES: Valerian is thought to be an antispasmodic and nerve sedative, but its influence is largely psychic, and in the ammoniated tincture the stimulating effects of the aromatic spirit of ammonia no doubt predominate.

Tinctura Valerianae Ammoniata (Tr. Valer. Ammon.), Ammoniated Tincture of Valerian, U. S. P.—One hundred Cc. represent the soluble constituents of 20 Gm. of valerian in aromatic spirit of ammonia.

Dosage: 2 Cc. or 30 minims.

Virus Vaccinicum (Virus Vaccin.), Vaccine Virus, U. S. P. (Glycerinated Vaccine Virus, Smallpox Vaccine, Jennerian Vaccine).—The material obtained from skin eruptions of calves having vaccinia. The material is removed and prepared under aseptic conditions. The "pulp" is ground and mixed with varying percentages of glycerin. It is marketed in capillary tubes. Only such vaccine may be sold as has been prepared in establishments licensed by the Secretary of the Treasury of the United States.

Action and Uses: Vaccine virus is used as a prophylactic against smallpox.

Zinci Acetas (Zinc. Acet.), Zinc Acetate, U. S. P.—Corresponds to not less than 99.5 per cent. of $Zn(C_2H_3O_2)_2+H_2O$.

Properties: Zinc acetate occurs as soft, white, pearly crystals, having a faintly acetous odor, and in dilute solutions an astringent, metallic taste. It is freely soluble in water (1: 2.3) and soluble in alcohol (1: 30).

Incompatibilities: Zinc acetate is incompatible with alkali carbonates or sodium borate.

Action and Uses: Zinc acetate is astringent and antiseptic. It is used principally in the form of solution as an external application, for injections and collyria; rarely used internally.

Dosage: 0.125 Gm. or 2 grains.

It may be used in collyria in the proportion of from 0.1 to 0.5 per cent. or from ½ to 2 grains per ounce.

Zinci Chloridum (Zinc. Chlor.), Zinc Chlorid, U. S. P.—Contains not less than 95 per cent. of $ZnCl_2$.

Properties: Zinc chlorid occurs as a white or nearly white granular powder or in porcelain-like masses, irregular or molded into pencils, odorless, and of such intensely caustic properties as to make tasting dangerous, unless freely diluted with water. The dilute solution has an astringent metallic taste. It is very soluble in water (1: 0.25) and in alcohol (1: 1.3).

Incompatibilities: Zinc chlorid is incompatible with sodium borate and with alkali carbonates.

Action and Uses: Zinc chlorid is used as an antiseptic, astringent and escharotic.

Liquor Zinci Chloridi (Liq. Zinc. Chlor.), Solution of Zinc Chlorid, U. S. P.—An aqueous solution containing about 50 per cent., by weight, of zinc chlorid made by dissolving granulated zinc in hydrochloric acid.

Zinci Oxidum (Zinc. Oxid.), Zinc Oxid, U. S. P.—Contains not less than 99 per cent. of ZnO.

Properties: Zinc oxid occurs as a very fine, amorphous, white or yellowish-white powder, free from gritty particles, without odor or taste. It is practically insoluble in water and in alcohol.

Incompatibilities: Zinc oxid is incompatible with acids.

Action and Uses: Zinc oxid is slightly antiseptic and feebly astringent and is widely used either alone or in combination with boric acid, bismuth subnitrate and starch as a dusting powder and as a sedative in ointment for a variety of skin diseases. It is now rarely used internally.

Unguentum Zinci Oxidi (Ung. Zinc. Ox.), Ointment of Zinc Oxid, U. S. P. (Zinc Ointment).—A mixture of zinc oxid (20 Gm.) with benzoinated lard (80 Gm.).

Zinci Stearas (Zinc. Stear.), Zinc Stearate, U. S. P.—A compound of zinc with stearic acid and small but variable proportions of palmitic acid. Contains about 15 per cent. of ZnO.

Properties: Zinc stearate occurs as a very fine, white powder, tasteless, and having a very faint odor, resembling that of fat. It is practically insoluble in water and alcohol.

Action and Uses: Zinc stearate is used as a dusting powder, but appears to have little or no advantage over zinc oxid. Care should be exercised against the accidental aspiration by infants and children of zinc stearate dusting powders.

Zinci Sulphas (Zinc. Sulph.), Zinc Sulphate, U. S. P.—Corresponds to not less than 99.5 per cent. of $ZnSO_4+7H_2O$.

Properties: Zinc sulphate occurs as colorless, transparent, rhombic crystals, or granular crystalline powder, without odor, and having an astringent, metallic taste. It is very soluble in water (1: 0.6), but practically insoluble in alcohol.

Incompatibilities: Alkali carbonates, sodium borate, tannin and vegetable astringents.

Action and Uses: Zinc sulphate is astringent, styptic and emetic. It is much used in collyria in conjunctivitis and is especially effective in that form caused by Morax-Axenfeld bacillus. It is employed as an injection in the treatment of the chronic stages of gonorrhea.

Dosage: As an emetic, 1 Gm. or 15 grains.

In collyria it may be used in the strength of from 0.1 to 1.0 per cent. or from 1 to 5 grains per ounce. As an injection in gonorrhea, solutions varying in strength from 0.5 to 4 per cent. may be used.

Zingiber (Zingib.), Ginger, U. S. P.—The dried rhizome of *Zingiber officinale*. Occasionally administered in the form of powder.

Action and Uses: Ginger is aromatic, stimulant and a stomachic tonic. It is a serviceable carminative in colic.

Dosage: 1 Gm. or 15 grains.

Tinctura Zingiberis (Tr. Zingib.), Tincture of Ginger. U. S. P. (Tincture of Jamaica Ginger).—One hundred Cc. represent the soluble constituents of 20 Gm. ginger in alcohol.

Dosage: 2 Cc. or 30 minims.

PHARMACEUTIC PREPARATIONS

The following are descriptions of the more commonly used pharmaceutic preparations of drugs:

AQUAE AROMATICAE, AROMATIC WATERS.—The official aromatic waters are aqueous solutions of volatile substances, usually volatile oils. They are used as vehicles for the more active, water-soluble drugs.

CACHETAE, CACHETS.—Cachets, or wafers, are made by pressing a mixture of flour, or starch and water between hot iron plates, and are used much in the same way as capsules for enclosing dry and powdered drugs, but are of greater capacity, accommodating from 0.5 to 1.0 Gm. of a powder. They have the advantage over capsules of being more readily dissolved and, despite their comparatively large size, are easily swallowed if previously dipped into water or if floated on a tablespoonful of water.

CAPSULAE, CAPSULES.—Capsules, either hard or soft, are made of gelatin molded over a suitable form. Soft capsules containing an admixture of glycerin to the gelatin, are used extensively for oils and oleoresins or solutions of active drugs in oils. Such capsules, containing as much as 5 Gm. of oil can be readily swallowed by most persons. Hard gelatin capsules may be used for dispensing of powders, masses, or liquids. They range in size from 00 to 5. Size 00 has capacity for about 0.5 Gm. of quinin sulphate or similar light substance, while it would hold 1.3 Gm. of as heavy a substance as bismuth subnitrate. Size 5 will hold about 0.05 Gm. of quinin sulphate. Aqueous or hydroalcoholic liquids, such as fluidextract of cascara sagrada, may be filled into capsules by the patient just before taking the dose; owing to solvent action on gelatin, such capsules should not be prescribed for dispensing by the druggist.

CATAPLASMATA, POULTICES.—Poultices are soft solid preparations used for the purpose of applying heat and moisture to localized areas of the body. This application of heat induces a superficial hyperemia which is believed to influence the circulation of the underlying parts. The poultices may also be made the means of applying counter-irritant drugs. A long-continued application tends to cause relaxation of the skin and to render it flabby.

CERATA, CERATES.—Cerates are solid ointment-like preparations containing sufficient wax to prevent them from melting at the temperature of the body.

CHARTAE, PAPERS.—Medicated papers are pieces of absorbent paper that have been treated with medicinal substances or suitably sized paper coated with a layer of the medicinal substance.

COLLODIA, COLLODIONS.—Collodions are solutions of pyroxylin (guncotton) in mixtures of ether and alcohol, or of acetone, and are intended for external application. The following preparations are now among those included in the Pharmacopeia:

CONFECTIONES, CONFECTIONS.—Confections, conserves or electuaries were formerly used extensively, and usually occur as soft, pasty solids consisting of active drugs mixed with sugar or honey.

DECOCTA, DECOCTIONS.—Decoctions are aqueous preparations made by boiling vegetable substances in water and then straining. They are generally made 5 per cent. in strength.

ELIXIRES, ELIXIRS.—Elixirs are sweetened, aromatic, alcoholic liquids similar to cordials and having probably the same origin.

EMPLASTRA, PLASTERS.—Plasters are solid preparations for external use and serve either as simple adhesives or as counterirritants. The official plasters are usually replaced by the commercial plasters made on a large scale by machinery, which have as a base a mixture of rubber, with solvents or diluents.

EMULSA, EMULSIONES, EMULSIONS.—Emulsions are aqueous preparations in which oils or resins are suspended by means of mucilaginous substances or other colloids.

ENEMATA, CLYSTERS.—An enema, or clyster, is a liquid preparation intended to be injected into the rectum.

EXTRACTA, EXTRACTS.—Extracts are soft, solid or powdered preparations made by evaporating a solution of the soluble constituents of vegetable or animal drugs at a low temperature.

FLUIDEXTRACTA, FLUIDEXTRACTS.—Fluidextracts are liquid preparations of such strength that each cubic centimeter represents the soluble constituents of 1 Gm. of the crude drug.

GLYCERITA, GLYCERITES.—Glycerites are solutions of medicinal substances in glycerin.

INFUSA, INFUSIONS.—Infusions are aqueous preparations made by pouring hot or cold water over a vegetable drug and allowing the mixture to stand for a definite period and then straining. They are usually made 5 per cent. in strength.

LINIMENTA, LINIMENTS.—Liniments are oily, soapy, or alcoholic liquid preparations intended for external application. Aqueous liquid preparations intended for local use are generally termed washes or lotions (Lotiones).

LIQUORES, SOLUTIONS.—Pharmaceutically, solutions are aqueous liquid preparations in which one or more generally nonvolatile substances are completely dissolved.

MASSAE, MASSES.—Masses are soft solid preparations of such consistency that they can be made into pills readily.

MELLITA, HONEYS.—Honeys are sweet liquids having honey as a base; they formerly were much used as vehicles.

MISTURAE, MIXTURES.—Mixtures are liquid preparations containing insoluble or partly soluble medicinal solids suspended in them.

MUCILAGINES, MUCILAGES.—Mucilages are aqueous solutions of gums or the mucilaginous principles of vegetable substances.

OLEATA, OLEATES.—The official oleates are combinations of alkalies or metallic oxids with oleic acid.

OLEA PINGUA, FIXED OILS.—Fixed oils and fats are neutral esters of vegetable or animal derivation, being compounds of acids (chiefly oleic, palmitic and stearic) with glycerol.

OLEA VOLATILIA, VOLATILE OR ESSENTIAL OILS.—Volatile or essential oils are liquids derived from plants and may contain or consist of neutral principles, aldehyds, ketones, phenols, esters or compound ethers.

OLEORESINAE, OLEORESINS.—Oleoresins are thick liquid preparations consisting of volatile oils and resins extracted from vegetable substances by ether, acetone or alcohol.

PILULAE, PILLS.—Globular, oval or flattened bodies, of such size and consistency that they can be swallowed whole.

PULVERES, POWDERS.—Pharmaceutically, powders are combinations of several substances in powdered form or powdered vegetable drugs. The term "powders" is also applied to single dose quantities of a drug or mixture of drugs in powdered form wrapped separately in "powder papers" (chartulae).

RESINAE, RESINS.—Resins are usually made by distilling the volatile oil from natural oleoresins or by precipitating resins from alcoholic solutions by the addition of water.

SALES EFFERVESCENTES, EFFERVESCENT SALTS.—Effervescent salts are mixtures of soluble salts with sodium bicarbonate and citric or tartaric acid, or a mixture of the two acids, designed to yield effervescent drafts when added to water.

SPIRITUS, SPIRITS.—Spirits are alcoholic solutions of volatile substances; either gases, liquids or solids.

SUPPOSITORIA, SUPPOSITORIES. — Suppositories are solid bodies intended to be introduced into the several natural orifices of the body for the purpose of producing systemic or local effects.

Suppositories are usually made with oil of theobroma as a base. Rectal suppositories should be cone-shaped and should weigh about 2 Gm. or 30 grains.

SYRUPI, SYRUPS.—Syrups are strong solutions of sugar and water with or without the addition of active medicaments.

TABELLAE, TABLET-TRITURATES, COMPRESSED TABLETS.—Tablet-triturates are small disks made by diluting powdered medicaments with powdered sugar of milk or with powdered sugar, moistening the powder with sufficient alcohol to make a paste, and pressing into suitable molds. Compressed tablets are medicinal substances or mixtures of substances compressed to the form of disks.

TINCTURAE, TINCTURES.—Tinctures, with a few exceptions, are alcoholic or hydro-alcoholic extractive preparations of vegetable drugs; the tinctures of potent drugs represent 10 Gm. of drug in 100 Cc. of the preparation, with the exception of tincture of iodin, which contains 7 Gm. of iodin in 100 Cc., while tinctures of less potent drugs vary in strength, but represent usually 20 Gm.

TRITURATIONES, TRITURATIONS.—Pharmacopeial triturations are active remedies diluted usually with 10 parts of sugar of milk.

TROCHISCI, TROCHES.—Troches, or lozenges, are flat solid bodies intended to be dissolved in the mouth for their local effect on the mucous membrane of the mouth and the throat.

UNGUENTA, OINTMENTS.—Ointments are soft, fatty solids of such consistency that they are readily spread at ordinary temperatures. When intended for systemic effect they are applied by inunction; ordinarily they are used as simple protectives.

TABLE SHOWING THE RECORDED SOLUBILITY OF SUBSTANCES INCLUDED IN THE LIST OF USEFUL DRUGS

Abbreviations and signs used:

dec. = decomposed; ins. = insoluble; 00 = nearly insoluble; 0 = slightly soluble; sol. = soluble; part. s. = partly soluble; v. s. = very soluble; misc. = miscible in all proportions; — — = unrecorded or uncertain.

The solubility values are for distilled water at approximately 25 C. and for the official U. S. P. alcohol at the same temperature and indicate the number of parts by measure of the solvent required to dissolve 1 part by weight of the substance.

Substance	Soluble in Parts of Water at 25 C.	Parts of Alcohol at 25 C.
Acacia U. S. P.	2	ins.
Acetanilidum U. S. P.	190	3.4
Acetphenetidinum U. S. P.	1,310	15
Acidum Aceticum U. S. P.	misc.	misc.
Acidum Acetylsalicylicum, N. N. R.	100	v. s.
Acidum Benzoicum U. S. P.	275	2.3
Acidum Boricum U. S. P.	18	18
Acidum Citricum U. S. P.	0.5	1.8
Acidum Hydrochloridum U. S. P.	misc.	....
Acidum Hydrocyanicum Dilutum, U. S. P.	misc.	misc.
Acidum Nitricum, U. S. P.	misc.	— —
Acidum Salicylicum, U. S. P.	460	2.7
Acidum Tannicum, U. S. P.	v. s.	v. s.
Aether, U. S. P.	12	misc.
Aethyl-Morphinae Hydrochloridum, U. S. P.	8	22
Alcohol, U. S. P.	misc.	....
Alumen, U. S. P.	7.2	ins.
Ammonia	v. s.	v. s.
Ammonii Carbonas, U. S. P.	4	part. s.
Ammonii Chloridum, U. S. P.	2.6	100
Amylis Nitris, U. S. P.	ins.	misc.
Antimonii et Potassii Tartras, U. S. P.	12	ins.
Antipyrina, U. S. P.	v. s.	1.3
Apomorphinae Hydrochloridum, U. S. P.	50	50
Argenti Nitras, U. S. P.	0.4	30
Arseni Trioxidum, U. S. P.	30-100	ins.
Arsphenamina, N. N. R.	sol.	....
Asafoetida, U. S. P.	part. s.	part. s.
Atropina, U. S. P.	445	2
Atropinae Sulphas, U. S. P.	0.4	5
Balsamum Tolutanum, U. S. P.	ins.	v. s.
Barbital, N. N. R.	150	8
Barbital-Sodium, N. N. R.	5	....
Benzoinum, U. S. P.	ins.	sol.
Benzosulphinidum, U. S. P.	290	31
Betanaphthol, U. S. P.	1,000	0.8
Bismuthi Subcarbonas, U. S. P.	ins.	ins.
Bismuthi Subgallas, U. S. P.	ins.	ins.
Bismuthi Subnitras, U. S. P.	ins.	ins.
Butyn	1	v. s.

Substance	Soluble in Parts of Water	Parts of Alcohol
Caffeina, U. S. P.	46	66
Caffeinae Sodio-Benzoas, U. S. P.	1	30
Calcii Carbonas, U. S. P.	0?8	ins.
Calcii Chloridum, U. S. P.	ins.	10
Calcii Lactas, U. S. P.	1.2	00
Calx, U. S. P.	20	ins.
Calx Chlorinata, U. S. P.	part. s.	part. s.
Camphora, U. S. P.	00	v. s.
Chloralum Hydratum, U. S. P.	0.25	1.3
Chloramin-T, N. N. R.	6	— —
Chloroformum, U. S. P.	210	misc.
Chromii Trioxidum, U. S. P.	0.6	dec.
Chrysarobinum, U. S. P.	00	385
Cinchophen, N. N. R.	6,220	119
Cocaina, U. S. P.	600	6.5
Cocainae Hydrochioridum, U. S. P.	0.4	3.2
Codeina, U. S. P.	120	2
Codeinae Phosphas, U. S. P.	2.3	325
Codeinae Sulphas, U. S. P.	30	1,280
Creosotum, U. S. P.	00	misc.
Cresol, U. S. P.	50	misc.
Cupri Sulphas, U. S. P.	2.5	500
Dichloramin-T, N. N. R.	0	....
Elaterinum, U. S. P.	ins.	325
Emetinae Hydrochloridum, U. S. P.	v. s.	v. s.
Eucalyptol, U. S. P.	00	v. s.
Ferri Chloridum, U. S. P.	0.2	v. s.
Ferri et Ammonii Citras, U. S. P.	v. s.	ins.
Ferri Phosphas, U. S. P.	v. s.	ins.
Ferri Sulphas, U. S. P.	1.4	ins.
Ferrum Reductum, U. S. P.	ins.	ins.
Formaldehydi, Liquor U. S. P.	misc.	misc.
Gelatinum, U. S. P.	swells	ins.
Glucosum Anhydricum	v. s.	0
Glycerinum, U. S. P.	misc.	misc.
Glycerylis Nitratis, Spiritus, U. S. P.	ins.	v. s.
Guaiacol, U. S. P.	53	misc.
Guaiacolis Carbonas, U. S. P.	ins.	60
Hexamethylenamina, U. S. P.	1.5	12.5
Homatropinae Hydrobromidum, U. S. P.	6	40
Hydrargyri Chloridum Corrosivum, U.S.P.	13.5	3.8
Hydrargyri Chloridum Mite, U. S. P.	ins.	ins.
Hydrargyri Iodidum Rubrum, U. S. P.	ins.	ins.
Hydrargyri Oxidum Flavum, U. S. P.	ins.	ins.
Hydrargyri Salicylas, U. S. P.	ins.	ins.
Hypophysis Sicca, U. S. P.	part. s.	....
Iodoformum, U. S. P.	10,000	60
Iodum, U. S. P.	2,950	10
Linum, U. S. P.	ins.	00
Luminal	00	sol.
Magnesii Carbonas, U. S. P.	ins.	ins.
Magnesii Oxidum, U. S. P.	ins.	ins.
Magnesii Sulphas, U. S. P.	1	ins.
Menthol, U. S. P.	00	v. s.
Methylis Salicylas, U. S. P.	ins.	misc.
Morphinae Hydrochloridum, U. S. P.	17.5	52
Morphinae Sulphas, U. S. P.	15.5	565

Substance	Soluble in Parts of water	Parts of Alcohol
Neoarsphenamina, N. N. R.	sol.	....
Neocincophen	00	....
Nitrogen Monoxidum	sol.	....
Oleum Carophylli, U. S. P.	ins.	v. s.
Oleum Morrhuae, U. S. P.	ins.	0
Oleum Ricini, U. S. P.	ins.	1
Oleum Santali, U. S. P.	ins.	sol.
Oleum Sinapis Volatile, U. S. P.	00	misc.
Oleum Theobromatis, U. S. P.	ins.	sol.
Oleum Tiglii, U. S. P.	ins.	00
Oxygenium, U. S. P.	34	3.6
Pancreatinum, U. S. P.	part. s.	ins.
Paraffinum, U. S. P.	ins.	ins.
Paraldehydum, U. S. P.	8	misc.
Pelletierinae Tannas, U. S. P.	240	16
Pepsinum, U. S. P.	50	ins.
Petrolatum Liquidum, U. S. P.	ins.	ins.
Phenobarbital	Sol.	Sol.
Phenol, U. S. P.	15	misc.
Phenolphthaleinum, U. S. P.	ins.	13
Phenylis Salicylas, U. S. P.	6,670	6
Phosphorus, U. S. P.	ins.	350
Physostigminae Salicylas, U. S. P.	75	16
Pilocarpinae Hydrochloridum, U. S. P.	0.3	3
Pilocarpinae Nitras, U. S. P.	4	75
Pix Liquida, U. S. P.	part. s.	misc.
Plumbi Acetas, U. S. P.	1.4	38
Potassii Acetas, U. S. P.	0.5	2.9
Potassii Bicarbonas U. S. P.	2.8	ins.
Potassii Bromidum U. S. P.	1.5	250
Potassii Carbonas U. S. P.	0.9	ins.
Potassii Chloras, U. S. P.	11.5	ins.
Potassii Citras, U. S. P.	0.6	ins.
Potassii et Sodii Tartras, U. S. P.	0.9	ins.
Potassii Hydroxidum, U. S. P.	0.9	3
Potassii Iodidum, U. S. P.	0.7	22
Potassii Permanganas, U. S. P.	13.5	dec.
Procain, N. N. R.	1	30
Protargin Fortius, N. N. R.	2	....
Protargin Mite, N. N. R.	2	....
Quinidinal Sulphas	sol.	sol.
Quinina, U. S. P.	1,560	0.8
Quininae Bisulphas, U. S. P.	8.5	18
Quininae Hydrochloridum, U. S. P.	18	0.8
Quininae Sulphas, U. S. P.	725	107
Quininae Tannas, U. S. P.	00	3
Quininae et Ureae Hydrochloridum, U.S.P.	0.9	2.4
Resorcinol, U. S. P.	0.9	0.9
Saccharum, U. S. P.	0.5	170
Saccharum Lactis, U. S. P.	4.9	ins.
Santoninum, U. S. P.	5,300	43
Sapo, U. S. P.	sol.	sol.
Sapo Mollis, U. S. P.	....	sol.
Scopolaminae Hydrobromidum, U. S. P.	1.5	20
Sodii Benzoas, U. S. P.	1.8	61
Sodii Bicarbonas, U. S. P.	10	ins.
Sodii Biphosphas, N. N. R.	v. s.	ins.
Sodii Bromidum, U. S. P.	1	16
Sodii Cacodylas, U. S. P.	0.5	2.5
Sodii Carbonas Monohydratus, U. S. P.	3	ins.

Substance	Soluble in Parts of Cold Water	Parts of Cold Alcohol
Sodii Chloridum, U. S. P.	2.8	ins.
Sodii Hydroxidum, U. S. P.	0.9	v. s.
Sodii Iodidum, U. S. P.	0.5	3
Sodii Nitris, U. S. P.	1.5	ins.
Sodii Phosphas, U. S. P.	5.5	ins.
Sodii Salicylas, U. S. P.	0.9	9.2
Sodii Sulphas, U. S. P.	2	ins.
Sodii Thiosulphas, U. S. P.	0.5	ins.
Strophanthinum, U. S. P.	v. s.	v. s.
Strychninae Nitras, U. S. P.	42	150
Strychninae Sulphas, U. S. P.	32	81
Sulphonethylmethanum, U. S. P.	200	v. s.
Sulphonmethanum, U. S. P.	365	60
Sulphur, U. S. P.	ins.	ins.
Terebinthina, N. F.	ins.	3
Terpini Hydras, U. S. P.	200	13
Theobromina, N. N. R.	ins.	100
Theobrominae Sodio-Salicylas, U. S. P.	1	....
Theophyllina, U. S. P.	100	80
Thymol, U. S. P.	1,010	1
Thymolis Iodidum, U. S. P.	ins.	ins.
Thyroideum Siccum, U. S. P.	part. s.	....
Trinitrophenol, U. S. P.	78	12
Zinci Acetas, U. S. P.	2.3	30
Zinci Chloridum, U. S. P.	0.25	1.3
Zinci Oxidum, U. S. P.	ins.	ins.
Zinci Stearas, U. S. P.	ins.	ins.
Zinci Sulphas, U. S. P.	0.6	ins.

WEIGHTS AND MEASURES

(The following is taken with some abridgment from "A Manual of Pharmacology," second edition, by Torald Sollmann, with the consent of the author.)

The Metric System.—This is based on the decimal system, and has for the unit of the measure of length the meter (M.). This was intended to be a natural unit, viz., the ten-millionth part of the distance from the pole to the equator of the earth at a particular meridian. Subsequent measurements have given a slightly different value to this distance. The meter is therefore an arbitrary standard—the length of a platinum bar, the original of which is preserved in Paris.

The meter is divided into 10, 100 and 1,000 parts, called, respectively, decimeter (dm.), centimeter (cm.), and millimeter (mm.). The thousandth part of a millimeter is a micron (μ). The contents of a cube whose edges measure a decimeter, or 10 cm., form the unit of capacity, the liter (L). The thousandth part of this is a cubic centimeter (c.cm., or, briefly, Cc.; also termed a "milliliter" or "mil."). The unit of weight is given by the weight of a liter of distilled water at 4° C. *in vacuo:* this is the kilogram (Kg.). A thousandth part of this is a gram (Gm.). A quantity ten times the unit is expressed by prefixing the Greek numeral Deca; one hundred times, Hecto; one thousand times, Kilo. The tenth part of the unit is expressed by prefixing the Latin numeral deci; one-hundredth, centi; one-thousandth, milli.

Thus:

1,000	Gm. =	Kilogram	(Kg.)[1]
100	Gm. =	Hectogram	(Hg.)
10	Gm. =	Decagram	(Dg.)
1	Gm. =	Gram	(Gm.)
0.1	Gm. =	decigram	(dg.)
0.01	Gm. =	centigram	(cg.)
0.001	Gm. =	milligram	(mg.)

[*In "Useful Drugs" only Kilogram (Kg.) Gram (Gm.) and Milligram (Mg.) are employed.*]

In quantities including several denominations, only one unit is used: thus, 1.234 Kg. would be read as 1,234 Gm.; 0.0002 Gm. as 2 mg., etc. The quantities are always denoted by arabic figures placed before the appellation. Fractional parts are always converted into decimal fractions.

In continental Europe, the liquid measure is very little used in pharmacy, liquids being usually weighed.

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1. Some authors begin all the abbreviations with capitals; others employ capitals for the units, gram, liter and meter, and their multiples; and small letters for fractions (as in the above lists). The latter plan has some advantages.

Common Systems of Weights and Measures.[2]—The denominations are the following:

APOTHECARIES' OR TROY WEIGHT

(USED IN PRESCRIPTIONS)

Grain (gr.)		
[Scruple (℈)	= 20 gr.]	
Dram[3] (ʒ)	[= 3 ℈]	= 60 gr.
Troy ounce (℥)	= 8 ʒ	= 480 gr.
[Troy pound	= 12 ℥	= 5,760 gr.]

(℥ j of water under standard conditions[4] measures 504.83 minims.)

AVOIRDUPOIS OR IMPERIAL WEIGHT

(A SYSTEM USED IN COMMERCE)

Grain	= same as Troy grain		
Ounce (oz.)	=		437½ grains
Pound (lb.)	=	16 oz.	= 7,000 grains
Ton	=	2,000 lb.	

UNITED STATES APOTHECARIES' OR WINE MEASURE

(USED IN UNITED STATES FOR BOTH PRESCRIPTION AND COMMERCIAL PURPOSES)

Minim (♏ or min.) (approximately equal to 1 drop or to 1 grain of water — more exactly, 0.95 grain).

Fluidram (fl ʒ)	= 60 ♏	
Fluidounce (fl ℥)	= 8 fl ʒ	= 480 ♏ (fl ℥ j of water at 4 C. weighs 456⅔ grains)
Pint (pt., or Octarius, O)	= 16 fl ℥	= 7,680 ♏
Quart (qt.)	= 2 pts.	= 32 fl ℥
Gallon (gal., or Conguis, C)	= 8 O	= 128 fl ℥ = 61,440 ♏

A gallon holds 231 cubic inches

Another system of liquid measure is in use in Great Britain, and must not be confused with the American system. It is the imperial measure.

In writing the apothecaries' measure in prescriptions, the figures are written in the roman system and placed after the appellation. Thus, gr. xx, not 20 gr. The ones are always dotted, and the last one is formed like a j: thus ʒ iij, ℥ vj, etc. The fl. before the sign is often omitted with liquids. Fractions are written as common fractions: gr. 1/10, not gr. 0.1.

Popular Measures.—These are formed of utensils commonly found in the household, and are, of course, inexact. They should be displaced by graduated medicine glasses, which can be obtained cheaply. Spoons are supposed to be filled so that the fluid stands level with the rim. The usually accepted equivalents of these measures are:

2. Those in square brackets are practically obsolete.
3. Also spelled drachm.
4. At 4° C. and in vacuo.

1 drop (gtt.)	= 1 minim[5]	= 0.05	c.c.
1 teaspoon	= 1 fℨ[6]	= 4	c.c.[7]
1 dessertspoon	= 2 fℨ	= 10	c.c.
1 tablespoon	= 4 fℨ (½ ℨ)	= 15	c.c.
1 wineglass	= 2 fℨ	= 50	c.c.
1 teacup	= 4 fℨ	= 125	c.c.
1 tumbler	= 8 fℨ	= 200	c.c.
1 knifepointful (tableknife)	= 15 to 30 gr.	= 1.0 to 2.0	Gm.

Equivalents of Metric and Common Systems.—Doses and formulas may be calculated from one system into the other. For this, it is only necessary to remember that 1 Gm. = 15.4 grains. However, this always entails the possibility of some error in reckoning, which may have serious consequences. The student is therefore advised to learn the dosage in both systems, and to construct prescriptions directly in whichever system is chosen. If a transposition must be made, the following approximate equivalents (which should be thoroughly memorized and practiced) are sufficiently exact for prescription purposes, and being simpler, they are less apt to lead to arithmetical errors than the exact equivalents.

APPROXIMATE EQUIVALENTS

1 Gm. } 1 c.c. }	= 15.5 grains or minims	1 grain or minim	= 0.065 Gm. or c.c.
1 milligram	= 1/64 grain	1 dram	= 4.0 (—) or c.c.
1 Liter	= 1 quart (+)	1 ounce	= 30.0 (—) or c.c.
1 Kilogram	= 2.2 lb.	1 pint	= 0.5 Liter (—)

Dosage Equivalents.—In memorizing "average doses" even this degree of approximation is needlessly complicated. The following table gives the most convenient figures:

Above 1 Gm.	Above 15 gr.	0.1 to 0.75 Gm.	1½ to 12 gr.	2 to 50 mg.	1/30 to 1 gr.	Below 2 mg.	Below 1/30 gr.
350	(12 ℨ)	0.750	(12 gr.)	0.050	(1)	0.0015	(1/40)
120	(4 ℨ)	0.500	(8)	0.030	(½)	0.001	(1/60)
25	(1 ℨ)	0.300	(5)	0.015	(¼)	0.00075	(1/80)
15	(4 ℨ)	0.250	(4)	0.010	(1/6)	0.0005	(1/120)
10	(2½ ℨ)	0.150	(2½)	0.008	(⅛)	0.0004	(1/160)
4	(1 ℨ)	0.200	(3)	0.005	(1/12)	0.0003	(1/200)
3	(45 gr.)	0.125	(2)	0.004	(1/15)	0.00025	(1/250)
2	(30 gr.)	0.100	(1½)	0.003	(1/20)	0.0002	(1/300)
1	(15 gr.)	.....	...	0.002	(1/30)	0.00015	(1/400)

EXACT EQUIVALENTS

1 m.	= 39.370 in.	1 inch	= 0.0254 M. = 2.54 cm.
	= 3 ft. 3.370 in.	1 ft.	= 30.227 cm.
	= 1 yd. 3.370 in.	1 yd.	= 91.440 cm.

5. The size of a drop varies according to the nature of the fluid and of the container; there may be from 50 to 150 to a fluid drachm. The International Protocol authorized a standard dropper, designed to deliver exactly 20 drops per cubic centimeter of water.

6. Really from ½ to 2 fℨ.

7. As a matter of fact, the actual capacity of teaspoons averages 5 c.c., when filled level

CAPACITY (UNITED STATES)

1 c.c. = 16.23 ♏.		1 ♏ = 0.06161 c.c.	
1 L. = 33.815 ƒ℥.		1 ƒ℥ = 3.7 c.c.	
= 2.113 pt.		1 ƒ℥ = 29.574 c.c.	
= 0.2642 gal.		1 pt. = 0.4731 L.	
		1 gal. = 3.7854 L.	

WEIGHT

1 mg. = 1/64 gr.		1 gr. = 64.8 mg. = 0.0648 Gm.	
1 Gm. = 15.432 gr.		1 ℥ = 3.888 Gm.	
= 0.03527 oz. Av.		1 oz. Av. = 28.3495 Gm.	
= 0.03215 ℥ Troy		1 ℥ Troy = 31.1035 Gm.	
1 Kg. = 2.2046 lb.		1 lb. = 0.4536 Kg.	

Thermometric Equivalents—Clinical Table of Centigrade and Fahrenheit

C.°	F.°	C.°	F.°
36.0	96.80	39.0	102.20
36.2	97.16	39.1	102.38
36.3	97.34	39.2	102.56
36.4	97.52	39.3	102.74
36.5	97.70	39.4	102.92
36.6	97.88	39.5	103.10
36.7	98.06	39.6	103.28
36.8	98.24	39.7	103.46
36.9	98.42	39.8	103.64
37.0	98.60	39.9	103.82
37.1	98.78	40.0	104.00
37.2	98.96	40.1	104.18
37.3	99.14	40.2	104.36
37.4	99.32	40.3	104.54
37.5	99.50	40.4	104.72
37.6	99.68	40.5	104.90
37.7	99.86	40.6	105.08
37.8	100.04	40.8	105.44
37.9	100.22	41.0	105.80
38.0	100.40	41.2	106.16
38.1	100.58	41.4	106.52
38.2	100.76	41.6	106.88
38.3	100.94	41.8	107.24
38.4	101.12	42.0	107.60
38.5	101.30	42.2	107.96
38.6	101.48	42.4	108.32
38.7	101.66	42.6	108.68
38.8	101.84	42.8	109.04
38.9	102.02	43.0	109.40

Method of Converting Centigrade to Fahrenheit

Multiply the centigrade reading by 9/5 (or 1.8) and add 32, which will yield the Fahrenheit equivalent.

Method of Converting Fahrenheit to Centigrade

Subtract 32 from the Fahrenheit reading and then multiply by 5/9, which will yield centigrade equivalent.

Example: Convert — 4 F. to centigrade.

$$\begin{array}{r} -4 \\ -32 \\ \hline -36 \end{array} \qquad -36 \times \tfrac{5}{9} = -20 \text{ centigrade}$$

THERAPEUTIC INDEX

The following classification of articles included in the list of useful drugs according to their therapeutic use has been adapted from the sixth edition of a textbook on pharmacology and therapeutics by Arthur R. Cushny. This index serves to indicate the comprehensiveness of the list and should assist in suggesting to practitioners and teachers possible additions and deletions that might be made so that the list will include all of the well-established remedies that are really of use.

For ready reference the titles used are those under which the drug or preparation has been included and described in the list of useful remedies.

I. Drugs Applied for Their Local Action to the Skin, Wounds or Visible Mucous Membranes

Corrosives or Caustics.

Acidum Aceticum
Acidum Nitricum
Alumen Exsiccatum
Argenti Nitras
Arseni Trioxidum
Chromii Trioxidum
Iodum
Phenol
Potassii Carbonas
Potassii Hydroxidum
Sodii Carbonas
Sodii Hydroxidum
Zinci Chloridum

Disinfectants and Antiseptics.

Acidum Benzoicum
Acidum Boricum
Acidum Salicylicum
Argenti Nitras
Calx
Calx Chlorinata
Camphora
Chloramina-T
Cresol
Dichloramina-T
Eucalyptol
Formaldehydi, Liquor
Hydrargyri Chloridum Corrosivum
Hydrargyri Iodidum Rubrum
Hydrargyrum Ammoniatum
Hydrogenii Dioxidi, Liquor
Iodoformum
Iodum
Olea Volatilia
Phenol
Pix Liquida
Potassii Permanganas
Protargin Fortius
Protargin Mite
Sulphur
Thymol
Zinci Chloridum

Local Anesthetics.

Aethylis Chloridum
Cocainae Hydrochloridum
Menthol
Phenacaina
Procaina

Astringents.

Acidum Tannicum
Alcohol
Alumen
Alumini Acetatis, Liquor
Argenti Nitras
Bismuthi Subcarbonas
Bismuthi Subgallas
Bismuthi Subnitras
Cupri Sulphas
Ferri Chloridum
Ferri Sulphas
Plumbi Acetas
Zinci Acetas
Zinci Oxidum
Zinci Sulphas

Styptics.

Alumen Exsiccatum
Ferri Chloridum

To Contract Vessels and Reduce Hemorrhage and Swelling

Epinephrina

Protectives

Amylum
Bismuthi Subcarbonas
Bismuthi Subnitras
Magnesii Carbonas
Collodion
Talcum
Zinci Oxidum
Zinci Stearas

Emollients

Adeps
Adeps Lanae
Olea Pingua
Petrolatum
Paraffinum

Local Anodynes and Analgesics for Pain and Itching.

Aconitum
Ammoniae, Aqua
Atropinae Sulphas
Chloroformum
Cocainae Hydrochloridum
Phenol
Sodii Bicarbonas

II. Drugs Used for Affections of the Alimentary Tract

MOUTH AND THROAT. (See also Section 1):

Demulcents.

Acacia
Ammonii Chloridum
Glycerinum

To Lessen Salivation.

Atropina

Flavoring Substances.

Acidum Citricum
Olea Volatilia
Saccharum
Syrupus Pruni Virginianae
Syrupus Tolutanus

STOMACH:

Digestives.

Acidum Hydrochoricum
Pepsinum

Emetics.

Apomorphinae Hydrochloridum
Cupri Sulphas
Ipecacuanha
Sinapis
Sodii Chloridum
Zinci Sulphas

To Lessen Irritation and Vomiting.

Bismuthi Subcarbonas
Bismuthi Subnitras
Chloralum Hydratum
Chloroformum
Liquor Calcis
Menthol
Morphinae Sulphas
Opium

To Lessen Acidity, Antacids.

Calcii Carbonas
Calx (Liquor Calcis)
Magnesii Carbonas
Magnesii Oxidum
Sodii Bicarbonas

To Increase Secretion, Bitters.

Cinchona
Gentiana
Nux Vomica
Quininae Sulphas
Strychninae Sulphas

To Destroy or Expel Parasites, Anthelmintics.

Aspidium
Chenopodii, Oleum
Chloroformum
Hydrargyri Chloridum Mite
Pelletierinae Tannas
Santoninum
Terebinthinae, Oleum
Thymol

Carminatives.

(See also Bitters)
Alcohol
Camphora
Capsicum
Cardamomum
Caryophyllus
Myrrha
Olea Volatilia
Sinapis
Zingiber

INTESTINE:

To Promote Digestion.

Pancreatinum (?)

To Promote Evacuation, Purgatives.

Vegetable Purgatives:

Aloes
Aloinum
Cascara Sagrada
Colocynthis
Jalapa
Physostigminae Salicylas
Podophyllum
Rheum
Ricini, Oleum
Senna
Tiglii, Oleum

Saline Purgatives.

Magnessii Carbonas
Magnesii Citratis, Liquor
Magnesii Oxidum
Magnesii Sulphas
Potassii Bitartras
Potassii Citras
Potassii et Sodii Tartras
Sodii Phosphas
Sodii Sulphas

Mercurial Purgatives.

Hydrargyri Chloridum Mite
Hydrargyrum cum Creta
Massa Hydrargyri

Miscellaneous.

Fel Bovis
Glycerinum
Petrolatum Liquidum
Phenolphthaleinum
Sulphur

To Lessen Movement and Relax Spasm.

Acidum Tannicum
Acetannin
Albutannin
Argenti Nitras
Atropinae Sulphas
Belladonna
Bismuthi Subcarbonas
Bismuthi Subnitras
Calx (Liquor Calcis)
Gambir
Morphinae Sulphas
Opium
Plumbi Acetas

To Decrease Intestinal Flora

(See also Vegetable, Saline and Mercurial Purgatives)

Creosotum

III. Drugs Used for Their Effects on the Circulation

HEART:

To Strengthen Contraction.

Digitalis.
Quinidinae Sulphas
Strophanthinum
Strophanthus

To Accelerate Pulse.

Atropinae Sulphas

To Slow Pulse.

Aconitum
Digitalis
Quinidinae Sulphas
Strophanthinum
Strophanthus

VESSELS.

To Contract Caliber and Raise Blood Pressure.

Epinephrina
Ergota
Hypophysis

To Relax Vessels and Lower Blood Pressure.

Amylis Nitris
Glycerylis Nitratis, Spiritus
Sodii Nitris

To Arrest Internal Hemorrhage.

Morphinae sulphas } To allay rest-
Opium } lessness

To Remove Fluid (Dropsy, Anasarca).

[See also Diuretics (Kidney), Diaphoretics (Skin), Vegetable and Saline Purgatives (Intestine)]

Digitalis
Hydrargyri Chloridum Mite
Strophanthinum
Strophanthus

IV. Drugs Used for Their Effects on the Genito-Urinary System

To Increase the Flow of Urine (Diuretics).

Caffeina
Digitalis
Hydrargyri Chloridum Mite
Potassii Acetas
Potassii Citras
Potassii Nitras
Strophanthinum
Strophanthus
Theobromina
Theophyllina

To Render the Urine Less Acid.

Potassii Acetas
Potassii Bicarbonas
Potassii Citras
Sodii Bicarbonas
Sodii Carbonas

To Render the Urine More Acid.

Sodii Biphosphas
Mineral Acids
Sodii Benzoas

To Render the Urine Antiseptic.

Acidum Benzoicum
Acidum Salicylicum
Hexmethylenamina
Santali Oleum
Sodii Benzoas
Sodii Boras
Sodii Salicylas
Local antiseptics, etc.

To Promote Menstruation, Emmenagogues.

Aloe
Aloinum

V. Drugs Used for Their Effects on the Respiratory System

To Stimulate the Respiratory Center.

Atropinae Sulphas
Caffeina
Strychninae Sulphas

To Reduce the Irritability of the Center in Cough.

Chloroformum
Codeinae Sulphas
Morphinae Sulphas
Opium

To Increase and Liquefy the Bronchial Secretion.

Ammonii Chloridum
Antimonii et Potassii Tartras
Apomorphinae Hydrochloridum
Ipecacuanha
Potassii Iodidum
Sodii Iodidum

To Lessen the Secretion of the Bronchi (?)

Atropinae Sulphas
Terpini Hydras

To Relax Bronchial Spasm in Asthma.

Amylis Nitris
Atropinae Sulphas
Belladonna
Epinephrina
Glycerylis Nitratis, Spiritus
Potassii Iodidum
Sodii Iodidum

To supplement Deficient Respiratory

Oxygenium

VI. Drugs Used for Their Effects on the Central Nervous System

Stimulants.

(a) The spinal cord:
Strychninae Sulphas
(b) The brain and medulla oblongata:
Atropinae Sulphas
Caffeina

Depressants.

(a) To paralyze sensation (general anesthetics):
Aether
Chloroformum
(b) To induce sleep and rest (hypnotics or narcotics):
Alcohol
Barbital
Barbital-Sodium
Chloralum Hydratum
Codeina
Luminal
Opium
Paraldehydum
Potassii Bromidum
Scopolaminae Hydrobromidum
Sodii Bromidum
Sulphonethylmethanum
Sulphonmethanum
(c) To relieve pain (analgetics or anodynes):
Acetanilidum
Acetphenetidinum
Acidum Acetylsalicylicum
Acidum Salicylicum
Amidopyrina
Antipyrina
Codeina
Methylis Salicylas
Morphinae Sulphas
Sodii Salicylas

To Relieve Convulsions

Aether
Chloralum Hydratum
Chloroformum
Magnesii Sulphas
Potassii Bromidi
Sodii Bromidi

VII. Drugs Used to Reduce Fever Temperature

Acetanilidum
Acetphenetidinum
Acidum Acetylsalicylicum
Acidum Salicylicum
Antipyrinum
Guaiacol
Sodii Salicylas

VIII. Drugs Used for Their Effects on the Liver

To Increase the Secretion of Bile,
Acidum Salicylicum

Cholagogues.
Fel Bovis

IX. Drugs Used for Their Effects on the Blood

To Increase the Hemoglobin.

Arseni Trioxidum
Ferri Carbonas
Ferri Iodidum
Ferri Phosphas Solubilis
Ferri et Ammonii Citras
Sodii Cacodylas

To Increase Alkali Reserve.

Potassii Bicarbonas
Potassii Citras
Sodii Bicarbonas
Sodii Carbonas

To Increase Coagulability (?)

Calcii Chloridum
Calcii Lactas

X. Drugs Used Against Specified Diseases

Amebic Dysentery.
- Emetinae Hydrochloridum
- Emetinae Bismutho-Iodidum
- Ipecacuanha

Cerebrospinal Meningitis.
- Serum Antimeningococcus

Diphtheria.
- Mistura Toxici Diphtheritici et Antitoxici Diphtheritici

Gout.
- Cinchophen
- Colchici Semen
- Neocinchophen

Malaria.
- Arseni Trioxidum
- Quinina

Myxedema and Some Other Thyroid Diseases.
- Glandulae Thyroideae Siccae
- Potassii Iodidi
- Sodii Iodidi

Rabies.
- Vaccinum Rabies

Rheumatic Fever.
- Acidum Acetylsalicylicum
- Acidum Salicylicum
- Cinchophen
- Methylis Salicylas
- Neocinchophen
- Sodii Salicylas

Rickets.
- Calcii Chloridum
- Calcii Lactas
- Oleum Morrhuae
- Phosphorus

Smallpox.
- Virus Vaccinicum

Syphilis.
- Arsphenamina
- Hydrargyri Chloridum Corrosivum
- Hydrargyri Chloridum Mite
- Hydrargyri Iodidum Rubrum
- Hydrargyri Salicylas
- Hydrargyrum
- Neoarsphenamina
- Potassii Iodidum
- Sodii Iodidum

Tetanus
- Serum Antitetanicum Purificatum
- Magnesii Sulphas

Trypanosomiasis.
- Antimonii et Potassii Tartras
- Arsphenamina

Tuberculosis.
- Tuberculin

Typhoid.
- Vaccinum Typhosum

XI. Drugs Used for Their Effects on the Skin

(See also Corrosives or Caustics; Emollients and Protective Local Anodynes and Anesthetics):

Irritants.
- Aconitum
- Alcohol
- Ammonia
- Camphora
- Cantharis
- Capsicum
- Chloroformum
- Iodum
- Menthol
- Sinapis
- Terebinthinae Oleum

Disinfectants or Irritants Used Chiefly in the Form of Ointments in Parasitic Skin Diseases.
- Balsamum Peruvianum
- Betanaphthol
- Camphora
- Chrysarobinum
- Hydrargyrum
- Iodum
- Pix Liquida
- Resorcinum
- Sulphur

Drugs Administered Internally to Increase the Secretion of Perspiration, Diaphoretics or Sudorifics.
- Antimonii et Potassii Tartras
- Camphora
- Ipecacuanha
- Opium
- Pulvis Ipecacuanhae et Opii
- Pilocarpinae Hydrochloridum

Drugs Administered Internally to Lessen Secretion of Perspiration
- Atropinae Sulphas
- Belladonna

XII. Drugs Used Locally for Their Effects on the Eye

(See also Astringents, Disinfectants, Caustics, Anodynes and Anesthetics):

Drugs Contracting the Pupil and the Ciliary Muscle, Myotics.
- Physostigminae Salicylas
- Pilocarpinae Hydrochloridum

Drugs Dilating the Pupil and Relaxing the Accommodation, Mydriatics.
- Atropinae Sulphas
- Cocainae Hydrochlridum
- Homatropinae Hydrobromidum
- Scopolaminae Hydrobromidum

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